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Environmental Engineering Series

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Environmental Engineering Series

GS-0819

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SERIES DEFINITION

This series includes positions that involve professional engineering work to protect or improve air, land, and water resources in order to provide a clean and healthful environment. Such work requires the application of (a) professional knowledge of the principles, methods, and techniques of engineering concerned with facilities and systems for controlling pollution and protecting quality of resources and the environment, and (b) an understanding of and the ability to utilize pertinent aspects of chemistry, biological sciences, and public health that pertain to the control or elimination of pollutants.

This standard supersedes the series coverage standard for the Sanitary Engineering Series, GS-0819, published in April 1968.

SERIES COVERAGE

The field of environmental engineering is characterized by: the application of professional competence in engineering with specialized knowledge of chemistry and biological science; and, a primary objective of protecting or improving the natural resources of air, land, and water to provide a clean and healthful environment. Although most environmental engineers are concerned in general with the outdoor environment, their work also may concern the interiors of buildings and other structures.

Environmental engineering is performed in a number of kinds of programs carried out by Federal agencies such as:

- -- planning, designing, constructing, modifying or improving, and maintaining facilities either by in-house or contractual effort;
- -- operating environmental engineering facilities or programs such as domestic waste treatment plants or water works;
- -- regulating and enforcing environmental engineering policies, programs, or activities involving municipalities, states, and Federal agencies by establishing standards, promoting improvements, evaluating compliance, and, if necessary, directing action to secure satisfactory results;
- -- investigating, measuring, and evaluating environmental conditions;
- -- investigating and studying physical phenomena to develop programs and methods to conserve natural resources and prevent, abate, or control pollution of the environment;
- -- planning comprehensive programs to enhance the environmen-developing and managing programs for the use or protection of such resources; and
- -- carrying out relevant research, development, planning, design, advisory, and related engineering activities.

Most environmental engineers perform work in one or a combination of basic specialty areas, namely, domestic and/or industrial waste collection, treatment, and disposal facilities; water supply, purification and distribution systems; refuse and solid waste collection and disposal

systems; and air pollution control or abatement systems. Such environmental engineers may also be concerned with the siting and layout of such facilities and systems to obtain use of land and resources and to achieve operational efficiency. Some environmental engineers have additional responsibilities for closely associated activities such as radiological health, noise abatement, control of insects and rodents, ocean dumping, control of herbicides or pesticides, and control of hazardous wastes or toxic substances. Although specialization in such activities is characteristic of other disciplines, the Environmental Engineering Series includes positions with responsibility both for engineering and such related activities.

In general environmental engineers are oriented in environmental affects and quality, natural resources recycle and recovery, and public health. The occupation includes engineering positions concerned generally with ecology or the quality of the environment where the work requires primarily the specialized professional competence of the environmental engineer. Thus, engineering positions concerned with diverse aspects of water or air pollution are classified to the Environmental Engineering Series.

RELATED OCCUPATIONS

1. Pharmacologists and toxicologists apply professional and scientific knowledge of the source, chemical and physical properties, action, absorption, distribution, metabolism, excretion, and use of drugs or toxic substances and related chemicals. Such positions are classified to the Pharmacology Series, GS-0405. The environmental engineer typically is concerned with the facilities or systems of industrial or municipal plants to the extent that they affect environmental resources.

2. Sanitarians plan, develop, administer, evaluate, and promote programs concerned with the elimination and prevention of environmental health hazards. These positions are concerned with the overall elimination and prevention of environmental health hazards of whatever kind and typically perform work in such environmental health areas as milk and dairy products, food sanitation, water supply, refuse and waste control, insect and rodent, shellfish, as well as recreation, housing, care facilities and other institutions. Such positions apply a broad knowledge of any one or a combination of the health, agricultural, physical or biological sciences sufficient to understand the basic concepts, principles, methods, and techniques of environmental health; and a practical knowledge of health laws, rules, and regulations. (See the classification standard for the Sanitarian Series, GS-0688.)

3. Formerly, water supply and water pollution control activities of environmental engineering were viewed as a specialized segment of civil engineering, the engineering discipline with major concern for facilities and systems directly related to water resources. Environmental engineering, however, requires understanding and application of biology and chemistry to develop supporting data and plan systems and facilities for controlling pollution and protecting the quality of resources and the environment. Positions which involve a combination of civil engineering projects and environmental engineering projects

concerned with water resources should be classified to the Civil Engineering Series, GS-0810, or Environmental Engineering Series, GS-0819, in accordance with the relative emphasis rather than the General Engineering Series, GS-0801.

4. Environmental engineering, especially the pollution control or abatement activities, has much in common with chemical engineering. If the emphasis of the work is on unit operations and processes in an industrial plant including incidentally the control and treatment of air and water pollutants or wastes, the position is classified in the Chemical Engineering Series, GS-0893. The environmental engineer is normally concerned with the waste treatment systems of industrial plants to the extent that they affect environmental resources.

5. The Mechanical Engineering Series, GS-0830, includes positions concerned with (a) heating, ventilating, and air-conditioning systems (temperature and humidity control of a confined environment); (b) mechanical aspects of water supply systems such as pumps, plumbing, and boiler water treatment systems; and (c) automotive and other powerplants affecting air pollution. (See the classification standard for the Mechanical Engineering Series, GS-0830.)

6. Biomedical engineering is a specialty field which requires the application of engineering concepts and methodology to investigate problems and phenomena of living systems to advance the understanding of these systems and improve medical practices; to develop materials, instruments, diagnostic and therapeutic devices, and other equipment applicable in the study of life systems and the practice of medicine; and to improve health service delivery systems for communities and within individual institutional components (hospitals, clinics, or other activities). Such work requires knowledge and skill in engineering disciplines in addition to a background in physiology and anatomy, and a practical facility in specialized subject matter areas such as computer applications, electronics, or mathematics. (See the series definition for the Biomedical Engineering Series, GS-0858.)

7. Mining engineers are concerned with work involving the application of mining engineering principles and practices dealing with mining health and safety, mine water control and drainage, and control of mine atmospheres. Environmental engineers may be concerned with the discharge of wastes resulting from mining operations into rivers or streams. (See classification standard for Mining Engineering Series, GS-0880.)

8. Work carried out by environmental engineers often uses or is based partly on data and information that is gathered and developed by persons whose work is within scientific fields rather than in environmental engineering. Because of this, there is sometimes an overlap of functions performed by environmental engineers and by persons in scientific occupations such as hydrology, chemistry, and biology. Series distinctions must be based primarily on the body of knowledges that a position requires, and partly on the techniques, considerations, and methods applied in accomplishing assignments. In the scientific

occupations, these are aimed largely at investigation and analysis of physical phenomena and characteristics, while environmental engineering is largely concerned with the application to be made of physical data in engineering design and planning. An additional determinant of the choice of the appropriate occupational series in some cases is the orientation and pattern of career development within the organization where the position is located. Positions in sciences such as hydrology and meteorology typically are concerned with the measurement, analysis, and description of air and water resources. Such work dealing with the location and extent of the resources may be closely related to or in support of environmental engineering. By contrast, environmental engineers are concerned with systems and facilities to manage or protect these resources. (See the series definitions and classification standards for the professional series in the Physical Sciences Group, GS-1300.)

9. Health physicists detect, monitor, and measure the exposure of persons to ionizing radiation and prescribe procedures and precautionary measures for protection of persons working in laboratories, industrial facilities, or nuclear power plants. Environmental engineers and health physicists are both concerned with the disposal of radioactive wastes. (See the classification standard for Health Physics Series, GS-1306.)

10. Industrial hygienists are concerned with the identification and evaluation of conditions at work sites affecting the health and efficiency of employees, the elimination of occupational disease hazards, and the promotion of industrial health programs. Environmental engineers may be concerned with systems and equipment affecting industrial hygiene programs. (See the series definition for Industrial Hygiene Series, GS-0690.)

11. Environmental engineering technicians are concerned with work primarily involving a practical knowledge of environmental engineering methods and techniques as distinguished from full professional knowledge of environmental engineering. (See the series definition and classification standard for the Engineering Technician Series, GS-0802. For further discussion of professional-technician relationships, refer to the introductory material for the Engineering and Architecture Group, GS-0800.)

QUALIFICATIONS REQUIRED

Historically, the environmental engineering discipline (heretofore identified as sanitary engineering) has been identified as the "sanitary" option of civil engineering. Since 1967, when this occupation was last studied, considerable environmental protection legislation has been enacted which has revolutionized national objectives and operative standards relative to environmental protection. New legislation has essentially disestablished traditional waste disposal technology (dilution and biological assimilation). The old disposal technology has been replaced with conservation technology, i.e., reduction, recovery, and reuse of wastes. Traditional waste treatment technology (best effort within traditional economics) has been replaced with requirements for a new level of controlled processing technology that can purify and stabilize low concentrations of complex heterogenous mixtures of wastes generally below detectable levels

using traditional instrumentation/measurement techniques. This new technology goes beyond chemical, mining, and manufacturing processes that simply "high grade" rich ores and/or formulate complex materials from pure substances. Under new laws, waste management, construction, and operations must proceed in an orderly and economic manner without biological, biochemical, and/or ecological damage to the living environment.

The Engineers' Council for Professional Development (ECPD) uses a guide to evaluate environmental engineering programs submitted for accreditation review. The guide was sponsored by major associations individually concerned with or involved in environmental quality, i.e., American Academy of Environmental Engineering, National Society of Professional Engineers, Air Pollution Control Association, American Institute of Chemical Engineering, American Public Health Association, American Public Works Association, American Society for Engineering Education, American Society of Civil Engineers, American Water Works Association, Association of Environmental Engineering Professors, and Water Pollution Control Federation. The accreditation guide identifies environmental engineering as composed of five specialty areas including industrial waste management and air pollution control, water quality control, and solid waste engineering. Within the referenced guide, undergraduate work is required to cover at least three of the program areas while master's degree programs may concentrate on a single specialty area. As defined in the guide, an educational program in environmental engineering is one that leads to a degree with "Environmental Engineering" or "Sanitary Engineering" in its title or as a major, whether the program resides in a separate department or as an option from another engineering discipline.

Accordingly, separate curricula outside the civil engineering department may be established in some schools. In other schools, the title of the option or curriculum may be sanitary engineering or environmental engineering or environmental health engineering. These changes reflect both the more intensive requirements for specialization and the expansion of the field to include air pollution control and other subjects.

Within the broad field of environmental engineering, specialty areas (e.g., domestic and/or industrial waste collection, treatment, and disposal; water supply, purification, and distribution; refuse and solid waste collection and disposal; and air pollution control) require knowledge of different basic sciences and areas of engineering technology. For example, certain areas of environmental engineering require a general understanding of the biological and health sciences plus advanced knowledge in a specialized area of biology; work relating to water pollution may require a background in physiology or toxicology. Other areas of environmental engineering typically need a knowledge of chemistry more advanced than first-year chemistry. Unit operations and processes of chemical engineering are important knowledge requirements of some positions. Because of the required knowledge of chemistry and engineering, chemical engineers with training in biology may be well qualified for environmental engineering work. The differences in the qualifications required for one specialty area as compared to another need to be considered in selective placement of candidates for positions even though they are not reflected in official class titles.

TITLES

Environmental Engineer is the basic title authorized for all positions in this series. Positions which meet or exceed the criteria of the Supervisory Grade-Evaluation Guide for evaluation as a supervisor are titled "Supervisory Environmental Engineer."

GRADING OF POSITIONS

The factor level descriptions as provided in this standard may be used to classify nonsupervisory environmental engineering positions at grades GS-5 through GS-15 in functional areas for which there are no separate grade evaluation guides. Benchmarks as provided in this standard cover nonsupervisory environmental engineering positions at grades GS-5 through GS-15. Two types of work specifically covered by this standard are:

-- Professional work which is accomplished primarily by application of, modification of, adaptation of, or compromise with standard guides, precedents, methods, and techniques.

-- Professional work which involves staff assignments as technical consultants and advisers and/or program coordinator-reviewers in engineering organizations engaged in or concerned with the preceding type work.

Excluded from the coverage of the grade level criteria in this standard are the following categories of positions:

-- Valuation -- Positions of environmental engineers who determine the value of property or facilities and costs related to providing services should be evaluated by reference to the Valuation Engineering Grade-Evaluation Guide, GS-0800.

-- Test and Evaluation -- Positions limited primarily to planning, performing, evaluating, and reporting of test of equipment should be evaluated by reference to the Test and Evaluation Engineering Grade-Level Guide, GS-0800.

-- Research -- Research positions should be evaluated by reference to the Research Grade-Evaluation Guide. The guide may also be used to evaluate the research portion of mixed positions.

-- Development -- Development engineering positions, or the development portion of mixed positions, should be evaluated by reference to the Equipment Development Grade-Evaluation Guide.

-- Supervision -- Supervisory positions should be evaluated by reference to the Supervisory Grade-Evaluation Guide, Part II.

-- Education-Training -- The Grade-Evaluation Guide for Instructor and Specialist positions Involving Education and Training Work provides classification criteria for positions of environmental engineers engaged in education.

EVALUATION NOTES

Positions should be evaluated on a factor-by-factor basis, using one or more of the comparable Civil Service Commission benchmarks or by reference to the Factor Level Descriptions for the Environmental Engineering Series. Only the designated point values may be used. More complete instructions for evaluating positions are contained in the introductory material for the Factor Evaluation System. The absence of a benchmark for positions at any grade between GS-5 and GS-15 does not preclude evaluation of positions at that grade.

GRADE CONVERSION TABLE

Total points on all evaluation factors are converted to GS grade as follows:

GS Grade	Point Range
5	855-1100
6	1105-1350
7	1355-1600
8	1605-1850
9	1855-2100
10	2105-2350
11	2355-2750
12	2755-3150
13	3155-3600
14	3605-4050
15	4055- up

FACTOR LEVEL DESCRIPTIONS

FACTOR 1, KNOWLEDGE REQUIRED BY THE POSITION

This factor measures the nature and extent of information or facts which the engineer must understand to do acceptable work (e.g., steps, procedures, practices, rules, policies, theories, principles, and concepts) and the nature and extent of skills necessary to apply these knowledges. The knowledges and skills of an environmental engineer relate to facilities and systems concerning

one or a combination of basic specialty areas, i.e., domestic and/or industrial waste collection, treatment, and disposal; water supply, purification, and distribution; refuse and solid waste collection and disposal; and air pollution control or abatement. To be used as a basis for selecting a level under this factor, a knowledge must be required and applied.

Level 1-5 -- 750 Points

A basic foundation of the professional concepts and principles of environmental engineering including specialized knowledge of chemistry and the biological and health sciences concerned with the protection and improvement of air, land, or water resources to provide a clean and healthful environment. These knowledges would typically be acquired through a bachelor's degree program in sanitary, environmental, or environmental health engineering.

OR

Equivalent knowledge and skill.

Level 1-6 -- 950 Points

A professional knowledge of conventional methods and techniques of one or more specialty areas of environmental engineering which would enable the engineer to independently perform assignments of moderate difficulty, i.e., those which do not require significant deviation from established methods and precedents. In addition, a general familiarity with the practices of related engineering disciplines (e.g., mechanical, civil, or electrical) as they apply to the specialty area. Assignments at this level are limited and are characterized by such features as:

-- a problem that is straightforward, or has been singled out of a larger investigation or project;

-- unknown factors or relationships are primarily matters of a factual nature or the mechanisms involved are fairly well understood; or

-- data can be obtained by use of established and analytical and investigative methods and techniques with minor modifications and adaptations that can be worked out by conventional procedures.

OR

Equivalent knowledge and skill.

Illustrations:

-- Knowledge and skill to design limited phases or segments of domestic waste disposal or pollution abatement facilities or to perform complete designs of such facilities for projects of limited size and complexity which can be accomplished by application of well established

engineering methods, e.g., a sanitary sewer system of a housing project when the facility is similar to previous or standard agency designs.

-- Knowledge and skill to perform the environmental engineering work associated with the alteration of segments of conventional or domestic or industrial waste disposal systems or pollution abatement facilities at a military installation.

-- Knowledge and skill to conduct surveys of the operation and maintenance of environmental engineering facilities and sanitary conditions at a military installation, e.g., a water supply system of a large military installation or one serving several installations.

Level 1-7 -- 1250 Points

Professional knowledges applicable to a wide range of duties in one or more specialty areas and the skill sufficient to:

-- modify standard practices and adapt equipment or techniques to solve a variety of engineering problems;

-- adapt precedents or make significant departures from previous approaches to similar projects to accommodate the specialized requirements for some projects; and

-- apply the standard practices of other engineering disciplines as they relate to a specialty area.

OR

Equivalent knowledge and skill.

Illustrations:

-- Knowledge and skill to prepare designs and specifications of an environmental facility (e.g., domestic waste treatment or water systems and appurtenances such as sewage treatment plants, filter plants, lift stations, wells, storage and pressure tanks, pumps and chlorinators) of a large military installation.

-- Knowledge and skill to prepare design features and plans for both repair and improvement projects and complete design of new environmental systems for a variety of specialties, e.g., domestic or industrial waste disposal systems, sanitary sewer systems, and water supply systems.

-- Knowledge and skill to conduct surveys and studies of the water supply for, the use of water on, and the disposal of waste at military installations, recommending the construction of new facilities or the modification of existing facilities based on consideration of economy and enginering feasibility.

-- Knowledge and skill to make pollution surveys requiring special field and laboratory studies of bodies of water into which sewage effluent or industrial wastes have been discharged.

-- Knowledge and skill to troubleshoot environmental engineering problems requiring the investigation of unsanitary or questionable conditions, e.g., incapability of existing facilities to collect, treat, and dispose of additional domestic or industrial wastes, maintenance and operational difficulties in newly constructed treatment plants, excessive costs, or inadequate output.

-- Knowledge and skill to provide staff advisory, planning, and reviewing services on specific problems, projects, programs, and functions within a specialty area (e.g., provision of potable water, water pollution control, solid waste disposal, air pollution control, or industrial waste control) for an engineering organization responsible for the maintenance, repair, and alteration of environmental engineering facilities that are of conventional design.

-- Knowledge and skill to troubleshoot and investigate problems restricting compliance with prescribed standards for treatment and emissions when solutions require recognition and analysis of undesirable trends and implementation or application of advanced or recently developed equipment, products, materials, methods, or techniques.

Level 1-8 -- 1550 Points

Mastery of one or more specialty fields to the extent that the engineer is capable of applying new developments and experienced judgement to solve novel or obscure problems and the skill sufficient to:

-- extend and modify existing techniques; and

-- develop new approaches for use by other engineering specialists in solving a variety of engineering problems.

Typically, the employee is a recognized expert in a specialty field.

OR

Equivalent knowledge and skill.

Illustrations:

-- Knowledge and skill to serve as a technical authority on all aspects of one or more specialty areas (e.g., solid waste disposal, sewage treatment, industrial waste disposal, water supply, air pollution abatement) within a major organization of an agency or department serving a multistate area with responsibility for providing expert advice on the interpretation and

implementation of technical policy directives and programs as well as the review of plans and specifications for projects in the organization and the provision of consultative services concerning the full range of environmental engineering facilities or systems pertinent to the specialty areas involved.

-- Knowledge and skill to develop and revise agency environmental engineering standards and specifications as well as portions of agency technical handbooks for guidance of agency engineering specialists, nationwide, and to furnish advice on the use and interpretation of the assigned technical guides.

-- Knowledge and skill to review and evaluate the work of environmental and other engineers in field offices and activities by reviewing preliminary engineering reports and related design drawings and specifications on proposed major construction projects which have sanitation features, approving, disapproving, or modifying such features by preparing supplementary justification of projects.

-- Knowledge and skill to guide and coordinate environmental engineering programs in an agency's field offices by initiating and formulating technical policies, criteria, standards, procedures, and similar guides for the design, construction, operation, maintenance, and management of water supply systems, waste disposal systems, and such related facilities as recreational areas.

-- Knowledge and skill to provide staff advisory, consulting, and reviewing services within a centralized engineering office of an agency with responsibility for reviewing and coordinating all work in a specialty area and proposing additional work in light of the needs of the agency.

-- Knowledge and skill to coordinate and review broad programs of an agency headquarters and field offices which are concerned with the design, construction, modification, maintenance, and operation of varied environmental engineering facilities under diverse conditions at numerous locations.

Level 1-9 -- 1850 Points

Mastery of one or more specialty fields and recognized skill in generating new hypotheses, developing new concepts, and planning and evaluating long range programs and projects; or skill sufficient to function as a nationally recognized consultant and expert.

OR

Equivalent knowledge and skill.

Illustration:

-- Knowledge and skill to serve as a recognized expert consultant to an agency having responsibility for the construction of environmental engineering facilities of unusual size and complexity with responsibility for observing, advising, and reporting on environmental engineering activities nation- or world-wide.

FACTOR 2, SUPERVISORY CONTROLS

This factor covers the nature and extent of direct or indirect controls exercised by the supervisor, the engineer's responsibility, and the review of completed work.

-- Controls are exercised by the supervisor in the way assignments are made, instructions are given to the engineer, priorities and deadlines are set, and objectives and boundaries are defined.

-- The engineer's responsibility depends on the extent to which the engineer is expected to develop the sequence and timing of various aspects of the work, to modify or recommend modification of instructions, and to participate in establishing priorities and defining objectives.

-- The review of completed work depends upon the nature and extent of the review, e.g., close and detailed review of each phase of the assignment; detailed review of the finished assignment; spot check of finished work for accuracy; or review only for adherence to policy.

Level 2-1 -- 25 Points

For both one-of-a-kind and repetitious tasks the supervisor makes specific assignments that are accompanied by clear, detailed, and specific instructions.

The engineer works as instructed and consults with the supervisor as needed on all matters not specifically covered in the original instructions and guidelines.

The work is closely reviewed. The review may include checking progress as well as reviewing completed work for accuracy, adequacy, and adherence to instructions and established procedures.

Level 2-2 -- 125 Points

Continuing or individual assignments are made by the supervisor who indicates generally what is to be done, limitation, quality and quantity to be expected, deadlines, and priority of assignments. The supervisor provides additional, specific instructions for new, difficult, or unusual assignments including suggested work methods or advice on source material available.

The engineer uses initiative in carrying out recurring assignments independently without specific instructions but refers deviations, problems, and unfamiliar situations not covered by instructions to the supervisor for decision or help.

The supervisor assures that finished work and methods used are technically accurate and in compliance with instructions or established procedures. Review of work increases with more difficult assignments if the engineer has not previously performed similar assignments.

Level 2-3 -- 275 Points

The supervisor makes assignments by defining objectives, priorities, and deadlines; and assists the engineer with unusual situations which do not have clear precedents.

The engineer plans and carries out the successive steps and handles problems and deviations in the work assignments in accordance with instructions, policies, previous training, or accepted engineering practices.
Completed work is usually evaluated for technical soundness, appropriateness, and conformity to policy and requirements. The methods used in arriving at the end results are not usually reviewed in detail.

Level 2-4 -- 450 Points

The supervisor sets the overall objectives and resources available. The engineer and supervisor, in consultation, develop the deadlines, projects, and work to be done.

The engineer, having developed expertise in the specialty area, is responsible for planning and carrying out the assignment; resolving most of the conflicts which arise; coordinating the work with others as necessary; and interpreting policy on own initiative in terms of established objectives. In some assignments, the engineer also determines the approach to be taken and the methodology to be used. The engineer keeps the supervisor informed of progress, potentially controversial matters, or far-reaching implications.

Completed work is reviewed only from an overall standpoint in terms of feasibility, compatibility with other work, or effectiveness in meeting requirements or expected results.

Level 2-5 -- 650 Points

The supervisor provides administrative direction with assignments in terms of broadly defined missions or functions.

The engineer has responsibility for planning, designing and carrying out programs, projects, studies, or other work independently.

Results of the work are considered as technically authoritative and are normally accepted without significant change. If the work should be reviewed, the review concerns such matters as fulfillment of program objectives, effect of advice and influence of the overall program, or the contribution to the advancement of technology. Recommendations for new projects and alteration of objectives are usually evaluated for such considerations as availability of funds and other resources, broad program goals, or national priorities.

FACTOR 3, GUIDELINES

This factor covers the nature of the judgment needed to apply guidelines. Since individual assignments vary in the specificity, applicability, and availability of guidelines the constraints and judgmental demands placed upon engineers also vary. The existence of specific instructions, procedures, and policies may limit the opportunity of the engineer to make or recommend decisions or actions; however, in the absence of procedures or under broadly stated objectives, the engineer may use considerable judgment in researching literature and developing new methods. For this factor, guidelines refer to standard guides, precedent, methods, and techniques including:

- -- agency manuals of instructions and operations;
- -- standard textbooks;
- -- manufacturers' catalogs and handbooks;
- -- standard designs developed and prescribed by the central engineering staff of the agency;
- -- master or guide specifications developed and prescribed by the central engineering staff of the agency;
- -- files of previous projects undertaken by the agency;
- -- standard work practices in the area of application as taught in engineering courses or generally accepted by engineers as a result of experience;
- -- codes and standards published by recognized engineering societies and organizations including regulatory and enforcement agencies; and
- -- governing policies and procedures of the agency.

Level 3-1 -- 25 Points

The engineer, generally a trainee, is provided specific guidelines such as technical manuals, instructions, and criteria that are detailed and directly applicable. The supervisor authorizes any deviations.

Level 3-2 -- 125 Points

The engineer is provided detailed and directly applicable guidelines such as standard instructions, literature, precedents, and practices in the area of assignment or specialization. Judgment is required in locating and selecting the most appropriate guidelines and references. Established procedures for performing the work are used, but the engineer may exercise discretion in selection

among alternative approaches. The employee may, on an irregular or intermittent basis, make minor deviations to adapt guidelines to specific cases. Situations requiring significant deviations from existing guidelines are referred to the supervisor.

Level 3-3 -- 275 Points

Guidelines include standard instructions, technical literature, agency policies and regulations, manufacturer's catalogs and handbooks, precedents and standard practices in the area of assignment or specialization. The engineer independently selects, interprets, and applies the guides, modifying, adapting, and making compromises to most of the requirements of the assignment. In addition, the engineer must exercise judgment in applying standard engineering practices to new situations and in relating new work situations to precedent ones.

Level 3-4 -- 450 Points

Guidelines are often inadequate in dealing with the more complex or unusual problems. The engineer is required to use resourcefulness, initiative, and judgment based on experience to deviate from or extend traditional engineering methods and practices in developing solutions to problems where precedents are not applicable. This level may include responsibility for the development of material to supplement and explain agency headquarters guidelines.

Level 3-5 -- 650 Points

Working chiefly under broad and general policy statements, regulations, and laws the engineer exercises considerable judgment and ingenuity in interpreting and adapting guides that exist and in developing new and improved hypotheses, approaches, or concepts not previously tested or reported in the literature of the field. Frequently, the engineer is recognized as a technical authority in the specialty area, with responsibility for the development of policies as well as nationwide standards, procedures, and instructions to guide operating personnel.

FACTOR 4, COMPLEXITY

"Complexity" covers the nature and variety of tasks, steps, processes, methods, or activities in the work performed; and the degree to which the engineer must vary the work, discern interrelationships and deviations, or develop new techniques, criteria or information. The basic unit of measuring this factor is the "complex feature." A complex feature is an individual engineering problem, broadly defined, which requires (1) modification or adaptation of, or compromise with, standard guides, precedents, methods, or techniques; or (2) special considerations of planning, scheduling, and coordination. In crediting a complex feature to a position, the following conditions must be met:

-- The duties and responsibilities of the position involve a specific, difficult problem requiring substantial analysis and evaluation of alternatives.

-- The engineer in the position solves the problem although it may be subject to preliminary discussion of background and possible approaches, and the solution may be reviewed for technical adequacy as well as for conformance with policy -- by the supervisor or others.

-- The solution of the problem involves (a) substantial modification or adaptation of, or compromise with, standard guides, precedents, methods, and techniques, or (b) difficult or unusual planning, scheduling, negotiating, or coordination.

-- The engineer applies a thorough knowledge of a variety of standard guides, precedents, methods, techniques, and practices in solving the problem.

Variations in the relative difficulty of work involving complex features are reflected below by the number of complex features and by their occurrence in combination. The interaction of complex features in combination is particularly significant in considering the relative intensity of all of the complex features in an assignment.

A complex feature can be concerned with technical engineering work or socio-economic, administrative, or other aspects of engineering work as illustrated in the following examples of complex features:

-- It is necessary to analyze and choose from among two or more standard methods from the standpoint of economy and engineering feasibility, when each approach contains advantages and disadvantages which do not readily or clearly outweigh those of the others. For example, cost considerations may dictate a compromise between a theoretically ideal method and a more economical but technically less satisfactory one. In like manner, there may be social, ecological, or other environmental considerations that make it necessary to analyze and weigh alternatives.

-- Standard material normally used by the agency in a given type of design is unavailable or is not suitable because of unfavorable local conditions. It is necessary to engage in an extensive literature search to arrive at a satisfactory substitute.

-- In making modifications and alterations to existing facilities it is necessary (a) to modify the design for loads and stresses not anticipated when the facility was originally designed, (b) to keep changes and costs to a minimum while achieving objectives, and (c) to modify standards and specifications to meet limitations of existing facilities.

-- Previous tests are not directly applicable in all phases because conditions to be simulated are different from those previously tested. It is necessary to devise departures from previous test methods and techniques to achieve the objectives of the test.

-- Special planning and scheduling is necessary to integrate completion dates for phases of Government work with phases to be performed by contractors, and, as necessary, to provide for continuing use of existing facilities.

-- When proposed work infringes on State or municipal structures or requires approval of such authorities, the engineer coordinates with State and local civil authorities by personal contact and correspondence.

-- The engineer presents special written analysis and justification to higher organizational entities regarding the economic, social, ecological, and other benefits that the general public will derive from the proposed work in comparison with estimated cost of such work.

Level 4-2 -- 75 Points

Assignments usually consist of specific, often unrelated, tasks that are designed to orient a trainee engineer in the practical application of theory and basic principles to ascertain the engineers interest and attitude and to relieve experienced engineers of detailed and simple work. Problems are readily solved by application of basic principles, elementary theories, and established practices. Work often consists of such detailed tasks as making calculations using standard formulas; preparation of graphs, curves, and tables; recording factual data in tests or from observation studies; drafting or minor detail design; and searching technical reports for information. At this level, tasks may be similar to those of nonprofessional employees, but are assigned primarily for training or development purposes.

Level 4-3 -- 150 Points

Assignments may consist of minor phases of a broader assignment of a higher-grade engineer which have typically been screened to eliminate complex features or may be similar to those previously encountered by the organization in which complex features occur infrequently or in isolated, single units. Assignments are carried out without substantial adaptation or modification of precedents, except for minor deviations -- such as sizes, dimensions, and relationships of details which can be resolved by engineering calculations typical of the specialization or area of assignment.

Level 4-4 -- 225 Points

Assignments typically contain combinations (e.g., two to five) of complex features. Work at this level typically involves the application of standard engineering practices to new situations and relating new work situations to precedent ones and, in addition, the modification or adaptation of and making compromises with standard guidelines.

Level 4-5 -- 325 Points

Assignments are of such breadth, diversity, and intensity that they involve many, varied complex features. The work requires that engineers be especially versatile and innovative in adapting, modifying, or making compromises with standard guides and methods to originate new techniques

or criteria. Individual assignments typically contain a combination of seven or more complex features which involve serious or difficult-to-resolve conflicts between engineering and management requirements.

Level 4-6 -- 450 Points

Assignments (a) concentrate on the limitation of proven concepts and practices of a broad and complex subject-matter field or functional area where issues and factors to be considered are largely undefined requiring extensive probing and analysis to determine the nature and scope of the problems, and (b) are characterized by unusual demands that are frequently due to extraordinary emergency, public interest, or economic restraints which create a need for the engineer to take shortcuts or make compromises that are considered risky or extreme within the context of standard guides, precedents, methods, and techniques. Analysis, as envisioned at this level, is carried to the point where either a solution is delivered on various problems or alternative further projects (pursued concurrently or sequentially with the support of others within or outside the organization) are initiated to alter standard concepts or theories, the objectives, and/or previously formulated requirements and criteria.

FACTOR 5, SCOPE AND EFFECT

This factor covers the relationship between the nature of the work, i.e., the purpose, breadth, and depth of the assignment, and the effect of work products or services both within and outside the organization.

Effect measures such things as whether the work output facilitates the work of others, provides timely services of a personal nature, or impacts on the adequacy of research conclusions. The concept of effect alone does not provide sufficient information to properly understand and evaluate the impact of the position. The scope of the work completes the picture, allowing consistent evaluations. Only the effect of properly performed work is to be considered.

Level 5-1 -- 25 Points

The purpose of the work is to orient the engineer in the practical application of academic theory and basic principles. Work tasks are specific and limited and are primarily for training purposes to equip engineers to assume more responsible engineering duties. The work's effect is to facilitate the work of the other engineers within the immediate organizational unit.

Level 5-2 -- 75 Points

The purpose of the work is primarily to provide assistance to experienced engineers by relieving them of detailed and routine work. Work efforts have an effect on the accuracy and reliability, as well as the timeliness, of the projects being performed by higher level engineers.

Level 5-3 -- 150 Points

The purpose of the work is to investigate and analyze any of a variety of problems or conditions and to provide or recommend ways of dealing with them. The engineering determinations affect the design or operation of equipment or facilities, with regard to economy, efficiency, and safety of the systems involved.

Level 5-4 -- 225 Points

The purpose of the work is to provide expertise as a specialist in a particular specialty field by furnishing advisory, planning or reviewing services on specific problems, projects, programs and functions. The work may include the development of criteria, procedures, or instructions for major agency activities. Work products impact on a wide range of the agency's engineering program.

Level 5-5 -- 325 Points

The purpose of the work is to resolve critical problems or to develop new approaches or methods for use by other engineering specialists. Often serving as consultant or project coordinator, the engineer provides expert advice and guidance to officials, managers and other engineers within or outside the agency, covering a broad range of engineering activities. Results of the efforts affect the work of other engineering experts both within and outside the agency or the development of major aspects of agency engineering programs.

Level 5-6 -- 450 Points

The purpose of the work is to plan and conduct vital engineering programs for the agency, which are often of national or international scope and impact. The engineer's recommendations and decisions on highly complex technical and policy areas frequently establish the agency's position, create agency precedents, and guide field installations on matters of major engineering significance. The engineer's actions affect the agency's engineering program on a long-term and continuing basis and often influence the programs of other agencies and outside organizations.

FACTOR 6, PERSONAL CONTACTS

This factor includes face-to-face contacts and telephone and radio dialogue with persons not in the supervisory chain. (NOTE: Personal contacts with the supervisor are covered under Factor 2, Supervisory Controls.)

Levels described under this factor are based on what is required to make the initial contact, the difficulty of communicating with those contacted, and the setting in which the contact takes place

(e.g., the degree to which the employee and those contacted recognize their relative roles and authorities).

Above the lowest level, points should be credited under this factor only for contacts which are essential for successful performance of the work and which have a demonstrable impact on the difficulty and responsibility of the work performed.

The relationship of Factors 6 and 7 presumes that the same contacts will be evaluated for both factors. Therefore, use the personal contacts which serve as the basis for the level selected for Factor 7 as the basis for selecting a level for Factor 6.

Level 6-1 -- 10 Points

Personal contacts are primarily with higher grade engineers or experienced engineering technicians within the immediate office or related units within the agency.

Level 6-2 -- 25 Points

Personal contacts are with a number of employees in the agency, but outside the immediate office, such as engineers and engineering technicians in other disciplines, architects, field personnel, space managers, and shop employees.

Level 6-3 -- 60 Points

Personal contacts include a variety of officials, managers, professionals or executives of other agencies and outside organizations. Typical of these contacts are manufacturers' representatives, private architecture-engineer firms, specialists at contractor plants, and engineers and architects from other Federal agencies, state and local governments.

Level 6-4 -- 110 Points

Personal contacts are with high ranking officials from outside the agency, including key officials and top engineering and scientific personnel of other agencies, state and local governments, private industry and public groups. The engineer may also participate, as a technical expert, in committees and seminars of national or even international importance.

FACTOR 7, PURPOSE OF CONTACTS

Purpose of personal contacts range from factual exchanges of information to situations involving significant or controversial issues and differing viewpoints, goals, or objectives. The personal

contacts which serve for the level selected for this factor must be the same as the contacts which are the basis for the level selected for Factor 6.

Level 7-1 -- 20 Points

Contacts are primarily, if not solely, for the purpose of exchanging information.

Level 7-2 -- 50 Points

Purpose of contacts is to plan and coordinate work efforts with co-workers, discuss technical requirements of equipment with manufacturers and resolve any problems concerning use, resolve questions of field personnel, discuss contract requirements, and generally clarify problems and reach agreement on overall plans and schedules. The persons contacted are usually working toward a common goal and generally are cooperative.

Level 7-3 -- 120 Points

Purpose of contacts is to influence or persuade other engineers to adopt technical points and methods about which there are conflicts, to negotiate agreements with agencies and contractors where there are conflicting interests and opinions among organizations or among individuals who are also experts in the field, or to justify the feasibility and desireability of work proposals to top agency officials.

Level 7-4 -- 220 Points

Purpose of contacts is to justify, defend, negotiate or settle highly significant or controversial engineering matters. Engineers often represent their agencies in professional conferences or on committees to plan extensive and long-range engineering programs and to develop standards and guides for broad activities.

FACTOR 8, PHYSICAL DEMANDS

This factor covers the requirements and physical demands placed on the engineer by the work assignment. This includes physical characteristics and abilities (e.g., specific agility and dexterity requirements) and physical exertion involved in the work (e.g., climbing, lifting, pushing, balancing, stooping, kneeling, crawling, or reaching). To some extent, the frequency or intensity of physical exertion is also considered, e.g., a job requiring prolonged standing involves more physical exertion than a job requiring intermittent standing.

Level 8-1 -- 5 Points

The work is principally sedentary, although there may be some walking or bending involved in activities such as inspections of installed equipment or construction or field site visits.

Level 8-2 -- 20 Points

The work requires regular and recurring construction or field inspections, investigations, or surveys in which there is a considerable amount of walking, stooping, bending, and climbing.

FACTOR 9, WORK ENVIRONMENT

This factor considers the risks and discomforts in physical surroundings or job situations and the safety regulations required.

Level 9-1 -- 5 Points

Work is usually performed in an office setting, although there may be occasional exposure to conditions in facilities or other structures under construction.

Level 9-2 -- 20 Points

There is regular and recurring exposure to moderate discomforts and unpleasantness such as high noise levels, high temperatures, adverse weather conditions, irritant chemicals, or fumes.

Level 9-3 -- 50 Points

Work involves regular and recurring exposure to potentially dangerous or hazardous situations, e.g., working at heights of 100 or more feet above the ground with potential weather extremes, terminal winds, or thunder storms; working in areas infested by snakes and reptiles; or working near open tanks devoid of oxygen, containing bacteria, or emitting hydrogen sulfide.

OPM BENCHMARK DESCRIPTIONS

ENVIRONMENTAL ENGINEER, GS-0819-05, BMK #1

Duties

As a trainee engineer performs duties which are designed to provide orientation in the application of academic theories and basic principles to environmental engineering work. Assignments are similar to those assigned to nonprofessional employees but are primarily for training purposes and, in some cases, to relieve higher grade engineers of routine work.

-- Receives formal and on-the-job instruction and training designed to provide familiarization with the functions and operations of the organization and to provide experience in the

practical application of basic environmental engineering principles, techniques, and concepts.

-- Assists higher grade engineers, individually or as a team member, in the design of selected, uncomplicated portions of environmental facilities by performing such tasks as:

1. Drafting or minor detail design.
2. Applying basic formulas to routine calculations.
3. Preparing graphs, curves, or tables.
4. Searching technical reports or manufacturer's catalogs to obtain information.

Factor 1, Knowledge Required by the Position -- Level 1-5 -- 750 Points

-- Professional knowledge of engineering concepts and principles as would typically be acquired through a bachelor's degree program in environmental engineering and would enable the engineer to perform trainee-level duties.

Factor 2, Supervisory Controls -- Level 2-1 -- 25 Points

Supervisor assigns work with specific and detailed instructions as to what is required and guidance as to reports to be used and probable results. Work is carried out under close supervision and, in addition, the supervisor or a higher grade engineer is frequently consulted on matters not specifically covered in the original instructions or guidelines. Work is reviewed in progress and on completion for technical accuracy and conformance to instructions.

Factor 3, Guidelines -- Level 3-1 -- 25 Points

Guidelines include technical manuals, directives, and criteria which are detailed and directly applicable. The trainee works in strict adherence to the guidelines, consulting the supervisor or higher grade engineer for authorization of any deviations.

Factor 4, Complexity -- Level 4-2 -- 75 Points

Assignments consist of specific, often unrelated tasks, designed to orient the trainee in the practical application of theory and basic principles of environmental engineering. These tasks are usually the routine and detailed work involved in projects of higher grade engineers.

Factor 5, Scope and Effect -- Level 5-1 -- 25 Points

The purpose of the work is to orient the trainee in the practical application of academic theory and basic principles of environmental engineering. The effect of the work is to facilitate the work of higher grade engineers within the immediate office.

Factor 6, Personal Contacts -- Level 6-1 -- 10 Points

Contacts are with higher grade engineers and engineering technicians within the immediate office.

Factor 7, Purpose of Contacts -- Level 7-1 -- 20 Points

Contacts are for the purpose of obtaining advice and direction and reporting on findings.

Factor 8, Physical Demands -- Level 8-1 -- 5 Points

Sedentary work

Factor 9, Work Environment -- Level 9-1 -- 5 Points

Work is performed in an office setting.

TOTAL POINTS -- 940

ENVIRONMENTAL ENGINEER, GS-0819-07, BMK #1

Duties

As an environmental engineer in a regional engineering office of a military department works on specified portions or minor phases of projects pertaining to: the expansion or improvement of domestic or industrial waste treatment facilities to protect receiving waters from degradation; sampling stack gases of industrial type sources to identify type and quantity of pollutants discharged into the air; and investigating solid waste collection and disposal methods. Assignments typically are screened to eliminate difficult or unusual problems and generally involve: (a) equipment such as comminutors, aerators, vacuators, clarifiers, chlorine injection apparatus digesters, sludge beds, shredders, pumps, or sewer mains associated with waste collection, treatment, and disposal facilities employing the trickling filter or activated sludge process; (b) instruments and devices such as weirs, flumes, flow and current meters, and flow recorders to measure quantity and quality of waste waters; and (c) instrumentation and apparatus such as opacity meters or hi-volume samplers to measure emissions.

-- Prepares layout and detail drawings from specific instructions, notes, or sketches, performing calculations such as pressure loss, required capacities, size of piping, etc.

-- Studies engineering manuals, periodicals, manufacturers' publications, and other technical material to obtain information on materials, equipment, and pertinent data to be used by higher level engineers in the development of specifications or technical reports.

-- Visits facility or construction sites to obtain information on environmental factors or condition of existing facilities or systems, taking measurements and calculating flows, measuring plume density and sizing particulates.

-- Reviews architect-engineer or contractor drawings for adherence to contract specifications, referring deviations to supervisor or higher grade engineer.

Factor 1, Knowledge Required by the Position -- Level 1-6 -- 950 Points

-- Knowledge of professional environmental engineering principles and concepts as well as the ability to apply standard engineering practices, methods, and techniques to perform relatively limited design work such as preparation of layout and detailed drawings for elements of domestic and industrial waste treatment facilities and the sampling or measurement of emissions and effluent.

-- Familiarity with related engineering disciplines, particularly mechanical and electrical.

Factor 2, Supervisory Controls -- Level 2-2 -- 125 Points

Supervisor makes assignments together with specific instructions as to objectives, scope, anticipated problems, and procedures to be used. Work of a repetitive nature is performed independently. Any deviations, problems or unusual situations are referred by the employee to the supervisor or higher grade engineer. Work is reviewed upon completion for accuracy and adherence to standard practices, and, to assure conformance with requirements.

Factor 3, Guidelines -- Level 3-2 -- 125 Points

Guidelines include technical manuals, directives, state codes, standards, engineering texts and specifications, and established practices. Such guidelines are detailed and are usually directly applicable to individual assignments. The employee exercises judgment in selecting appropriate guidelines and deciding among alternative approaches. Situations where existing guidelines are inadequate are referred to supervisor or higher grade engineer.

Factor 4, Complexity -- Level 4-3 -- 150 Points

Assignments consist of varied projects which are intended to provide diversified experience as a foundation for future project responsibility of greater scope, difficulty, or magnitude. Assignments are typically screened to eliminate difficult or unusual problems. Assignments require familiarity with and use of standard engineering principles, methods, and practices to solve relatively limited professional problems.

Factor 5, Scope and Effect -- Level 5-2 -- 75 Points

The purpose of the position is to prepare layout and detail drawings and perform related work of a relatively routine nature concerned with the expansion or improvement of existing facilities and systems, measurement of effluent or emissions, and the methods used to dispose of solid wastes.

Work efforts have an impact on the adequacy of designs and efficiency of operating equipment and relieve higher grade engineers of the more routine work.

Factor 6, Personal Contacts -- Level 6-2 -- 25 Points

Personal contacts are with other engineers and engineering technicians within the immediate office, agency facility operators, or agency maintenance personnel.

Factor 7, Purpose of Contacts -- Level 7-1 -- 20 Points

Contacts are chiefly to obtain advice or assistance, to report on status or results of work, and to obtain information on condition of existing facilities and systems.

Factor 8, Physical Demands -- Level 8-1 -- 5 Points

Work is essentially sedentary except for occasional walking, bending, and climbing during facility or construction site visits.

Factor 9, Work Environment -- Level 9-1 -- 5 Points

Work is usually performed in an office setting although there are occasional visits to facility or construction sites.

TOTAL POINTS -- 1480

ENVIRONMENTAL ENGINEER, GS-0819-09, BMK #1

Duties

Serves as an environmental engineer within a district office of a military department's design and construction engineering organization with responsibility for the design of industrial and domestic waste treatment facilities, pumping stations and sanitary sewer systems, and water supply, distribution, and storage facilities. Assignments (a) involve additions to or improvements of existing facilities and systems and, to a lesser extent, new construction, (b) pertain to small, routine projects or portions of large, complex projects, and (c) embrace facilities and systems on military or other government installations within a five-state area.

-- Reviews design directives, available criteria, and basic data to determine character, uses, and special features of projects.

-- Determines chemical nature of waste or water and specific requirements with respect to location, size, quantities, and spacing of pumps, pipes, valves, hydrants, reservoirs, and elevated or ground storage tanks, and routing of distribution or collection systems.

-- Calculates pressures or pressure losses, considering such factors as areas to be serviced or protected, controls to be used, usage frequency, and volume.

-- Prepares concept, preliminary and final design analyses, drawings, quantity estimates, outline and project specifications, considering needs of the user, space, capacities, and economy.

-- Visits work sites to obtain information such as condition of systems, location of sewer mains, local water pressures, plumbing layouts.

-- Reviews architect-engineer designs and specifications for conformance with contractual requirements, economy and feasibility of design, accuracy of design, and adequacy of type, size, and capacity of components, recommending changes to effect greater economy, more efficient layout, and similar benefits.

Factor 1, Knowledge Required by the Position -- Level 1-6 -- 950 Points

-- Professional knowledge of environmental engineering concepts and principles and a practical knowledge of conventional methods and practices to complete relatively routine design projects (or portions of large, complex projects) involving industrial waste or domestic sewage treatment plants, pumping stations and sewer systems, or water supply, distribution, and storage facilities.

-- Familiarity with related engineering fields such as mechanical, structural, and electrical.

-- Knowledge and skill to design facilities or systems such as could be acquired by a bachelor's degree in sanitary or environmental engineering supplemented by experience in the specialty field.

Factor 2, Supervisory Controls -- Level 2-3 -- 275 Points

Supervisor makes assignments in the form of complete projects of moderate scope or portions of more complex projects together with overall objectives, priorities and deadlines. The employee plans own work, coordinates with other engineers or subject-matter specialists, and carries assignments through to completion. The employee makes independent decisions on technical matters which are treatable by standard practices and techniques, referring unusual or especially difficult problems together with a recommended course of action to the supervisor or higher grade engineer for clarification or appropriate guidance. Work is reviewed upon completion for technical adequacy and conformance with objectives.

Factor 3, Guidelines -- Level 3-3 -- 275 Points

Guidelines consist of agency engineering manuals and publications; textbooks; local, state, and Federal codes and standards; manufacturers' catalogs; and agency policy and program directives. The employee is expected to be thoroughly familiar with such guidelines and be able to interpret them and apply precedents and experience to new situations. Judgement and originality are required to correlate theoretical considerations with experience to evolve engineering compromises, as necessary, and to plan and coordinate action promptly to assure technically adequate designs.

Factor 4, Complexity -- Level 4-3 -- 150 Points

Assignments primarily involve projects which are routine and of moderate scope but also include minor portions of large, more complex projects. In either instance complex features are non-existent or occur relatively infrequently. Problems encountered generally require application of varied but standard engineering methods and techniques.

Factor 5, Scope and Effect -- Level 5-3 -- 150 Points

The purpose of the position is to design additions to or improvements for existing or construction of new industrial or domestic waste treatment facilities, pumping stations and sanitary sewer systems, and water supply, distribution and storage facilities on military and other government installations within a five-state area. Solution of design problems involve engineering determinations which impact the safety, economy, efficiency, and types and sizes of such facilities and systems.

Factor 6, Personal Contacts -- Level 6-3 -- 60 Points

Contacts are with engineers and other subject matter specialists within the district office as well as architect-engineers, contractors, officials and managers of the using agency, and manufacturers' representatives.

Factor 7, Purpose of Contacts -- Level 7-2 -- 50 Points

Contacts are to exchange information, coordinate projects, discuss contract requirements, and obtain information on equipment.

Factor 8, Physical Demands -- Level 8-1 -- 5 Points

Work is chiefly sedentary with some minor physical activity during construction site visits.

Factor 9, Work Environment -- Level 9-1 -- 5 Points

Work, for the most part, is usually performed in an office setting although there is occasional exposure to conditions in or adjacent to domestic and industrial waste and water treatment facilities or systems undergoing modification or construction.

TOTAL POINTS -- 1920

ENVIRONMENTAL ENGINEER, GS-0819-11, BMK #1

Duties

Serves as an environmental engineer on the staff of a regional office of a regulatory and enforcement agency with responsibility for monitoring the adequacy of waste water discharge permits issued by one of a number of states comprising the region. Assignments (1) pertain to the reduction of the quantity of pollutants in discharges from point sources (i.e., factories or municipalities) into the state's navigable waters, (2) involve applications (filed by each point source) for a discharge permit which will specify maximum levels of effluent discharges according to established effluent limitations, (3) involve varied pollutants which individually, or when combined with other pollutants under varying conditions, are harmful to human populations or the environment, (4) concern numerous point sources (a number of which are major industrial or municipal facilities) located throughout the state or in a specific geographical area of a state, and

(5) are of average complexity, including, for example, primary, secondary, and tertiary waste water treatment processes which in some instances also involve pretreatment plants for large industrial users of municipal facilities.

-- Reviews forecast/discrepancy reports, investigation or inspection reports, and letters of inquiry or complaint, determines whether a source is in compliance or noncompliance and whether action taken or contemplated by state regulatory agency is technically adequate, coordinates discrepancies or insufficiencies with state regulatory agency.

-- Inspects industrial or municipal sources to observe actual operations and gather facts to evaluate performance of water pollution control activities, evaluates efficiency of equipment and practices, prepares effluent calculations, and writes reports of findings together with reasons for failure to comply with standards and proper remedial action to correct failures.

-- Reviews reports of inspections or investigations conducted by other regional personnel to determine appropriateness of actions taken involving non-compliance cases. Determines need for and requests additional regional personnel to conduct special field inspections of sources identified as potential violators of permit conditions or other applicable laws and regulations.

-- Recommends appropriate enforcement action on permit violators, preparing engineering background reports which include the nature and extent of non-compliance, feasibility of alternative remedial action or solution, and time schedule for taking corrective action.

-- Confers with regional attorneys, providing technical data for inclusion in administrative orders or consent decrees. Reviews source response pursuant to an issued enforcement action to determine technical sufficiency, recommending further action where appropriate.

-- Responds to inquiries from state officials, citizens, or representatives of industrial or municipal plants concerning the interpretation and application of policy directives and regulations pertinent to the agency's permit program. Responds to congressional inquiries and requests from agency headquarters concerning status of state's permit program or findings pertinent to specific industrial or municipal plants within the state.

-- Prepares reports or other documents to explain, verify, or justify water enforcement actions at public meetings or hearings where technical abatement requirements are an issue, serving as an expert witness as required.

Factor 1, Knowledge Required by the Position -- Level 1-7 -- 1250 Points

-- Knowledge of professional environmental engineering concepts, principles, and practices concerned with the control or reduction of the quantity of pollutants in discharges from point

sources (factories or municipalities) into the navigable waters of a state to levels adequate to protect public health and welfare. Included are knowledge of:

- the design and operating characteristics of industrial and municipal waste water treatment plants, including primary, secondary, and tertiary processes.

- standard waste water pollutants (e.g., such nutrients as phosphorus or nitrogen, suspended solids, bacteria, fluorides, organic compounds such as phenols) and standard treatment processes, e.g., sedimentation, trickling filter, activated sludge, coagulation-sedimentation or electrodialysis, and absorption.

- sampling techniques (e.g., time and flow proportional) and instruments and devices (e.g., weirs, flumes, flow and current meters, flow recorders) to measure the quantity and quality of industrial and municipal waste waters.

- Familiarity with related engineering disciplines, particularly chemical engineering in recognizing inefficient industrial processes.

Factor 2, Supervisory Controls -- Level 2-3 -- 275 Points

Supervisor makes assignments in the form of responsibility for a specific state together with instructions concerning functions and pertinent objectives, policies, and deadlines or priorities. The employee works with a relative degree of independence from technical supervision by planning own work, coordinating with other engineers or subject-matter specialists, and carrying assignments through to completion. Unusual problems, controversial issues, or matters that affect policy are referred to the supervisor or higher grade engineer who provides additional guidance and instruction. Work is judged by overall results obtained and soundness of professional and technical judgments reflected in accomplishments.

Factor 3, Guidelines -- Level 3-3 -- 275 Points

Guidelines include agency and regional policies and regulations, standard technical literature, established effluent or water quality standards for municipal and industrial sources, agency and regional technical publications, precedents and practices in the field of water pollution control. The employee exercises judgment in monitoring the state's permit program by advising state officials on the interpretation and application of agency and regional policy and regulations; and, the application or adaptation of standard practices to new situations or in relating precedents to situations with comparable but conflicting issues. Nearly all problems are guided by past precedent or standard practices; however, guidelines are not always completely applicable and the relationship of past practices to problems at hand are not always obvious. Due to the varied characteristics of industrial and municipal sources and different effluent standards established for varied geographical areas the employee uses ingenuity in adapting guidelines as and where required.

Factor 4, Complexity -- Level 4-4 -- 225 Points

Assignments involve a full range of waste water treatment facilities that are typically found in or required for municipalities and industrial type plants. Individually, such facilities involve several complex features that vary from one facility to another. Technical considerations involving the measurement and control of pollutants, while normally within the state-of-the-art, entail adapting standard techniques since municipal and industrial sources involve varied characteristics for which standard methods are not always directly applicable. The employee also makes engineering-economic assessments of proposed pollution control plans for new sources.

Factor 5, Scope and Effect -- Level 5-1 -- 150 Points

Purpose of the position is to monitor a state's waste water discharge permit program. Involved are technical and administrative issues on a case-by-case basis that may lead to possible litigation against municipalities or industrial concerns for non-compliance with established standards.

Factor 6, Personal Contacts -- Level 6-3 -- 60 Points

Personal contacts are with engineers and other subject-matter specialists including lawyers within the regional headquarters, state officials and subject-matter specialists, and officials or subject-matter specialists of varied municipalities and industrial concerns.

Factor 7, Purpose of Contacts -- Level 7-3 -- 120 Points

Contacts are made to discuss and assess the adequacy of a state's permit program and water pollution control activities; plan for and coordinate individual inspections of municipal or industrial waste water treatment facilities; advise state or municipal or industry representatives of the need for (and findings resulting from) individual inspections of municipal or industrial waste water treatment facilities and requirements to conform with legal statutes; and provide technical information for inclusion in administrative order or consent decrees. Such contacts frequently involve resolving conflicting technical issues between state officials, municipalities, and consultant engineers.

Factor 8, Physical Demands -- Level 8-2 -- 20 Points

Work within the office is sedentary; however there is considerable walking, stooping, bending, and climbing during the conduct of inspections.

Factor 9, Work Environment -- Level 9-1 -- 5 Points

Work, for the most part, is usually performed in an office setting, although there is occasional exposure to conditions in or adjacent to municipal and industrial waste water treatment facilities and points of discharge.

TOTAL POINTS -- 2380

ENVIRONMENTAL ENGINEER, GS-0819-11, BMK #2

Duties

Serves as the environmental engineer for a military installation with responsibility for the implementation of environmental engineering policies and programs that embrace a range of subjects directly or indirectly concerned with public safety and welfare and protection of the installation's natural resources. The installation (a) employs 11,000 employees, (b) is involved in aircraft maintenance and industrial support activities, and (c) includes a 230-bed hospital, a 215 site trailer park, 2,060 housing units on-base and 28 at four off-base satellites (individually equipped with independent water systems and secondary package treatment plants), barracks of 3,300 capacity, and such recreational facilities as a pond, a lake, 4 swimming pools, and a golf course. The policies and programs involved include such subjects as: acquisition of potable water via contract for such uses as industrial processes, housing, and fire protection; domestic and industrial waste treatment and water distribution and storage facilities; chemical treatment of potable and industrial water supplies; water supply resources management; control of galvanic and electrolytic corrosion in boilers, water storage tanks, and cooling towers; chemical and biological treatment and disposal of domestic and industrial waste by on-base facilities; collection and disposal of trash and refuse via contract; sanitation of recreational facilities; control of herbicides and pesticides as used in residential or recreational areas; noise abatement; control of air pollution as may be affected by power plants or medical and classified incinerators on-base; and the identification and stocking of fish. Assignments also include responsibility for the technical adequacy of plans, designs, and specifications for the modification or improvement of existing sewage treatment, industrial waste, and water distribution and storage facilities of the installation and similar facilities (including water supply systems) at off-base satellite sites.

-- Interprets and implements new or revised policy directives or program materials of higher authority or regulatory agencies, establishing plans for use installation-wide. Initiates action to resolve problems, including the initiation of, and response to, impact statements concerning the installation's activities on public safety, ecology, and environment.

-- Represents installation at conferences and on panels and committees comprised of representatives of other government (local, state, or Federal) agencies and commercial organizations.

-- Inspects and evaluates facilities periodically, as required, or in response to requests to identify and resolve problems or determine need for modernization, alteration, and repair.

-- Analyzes requirements, developing design and/or specifications or preparing statement-of-work and fee estimates for eventual award of contract to architect-engineering firms.

-- Reviews plans, specifications, and estimates of architect-engineer or other government agencies to assure on- or nearby off-base personnel are afforded a healthy environment and that proper sanitary features are provided.

-- Serves as member of architect-engineer selection board, assists contracting officer in negotiating architect-engineer contracts (fixed price), and serves as architect-engineer technical contact, answering questions and providing information during course of work.

-- Provides related engineering service for the design and construction of water and storm drainage systems.

Factor 1, Knowledge Required by the Position -- Level 1-7 -- 1250 Points

-- Knowledge of professional environmental engineering concepts, principles, and practices applicable to the full range of duties concerned with the operation, maintenance and modification of sanitary facilities (e.g., domestic and industrial waste treatment systems and water distribution and storage systems) and the implementation and administration of related programs at a military installation.

-- Knowledge and skill sufficient to adapt standard practices, equipment, or techniques in preparing specifications and designs (or monitoring those prepared by others) for the improvement or alteration of existing or the eventual construction of new facilities.

-- Familiarity with related engineering fields such as mechanical and electrical.

-- Knowledge and skill to assess the impact of the installation's activities on public safety, ecology, and environment involving matters directly or closely related to public welfare and protection of natural resources.

Factor 2, Supervisory Controls -- Level 2-4 -- 450 Points

Supervisor makes initial assignments in the form of broad functional responsibilities together with broad overall objectives. Individual projects or work to be done, priorities and deadlines are established by the employee in consultation with the supervisor. The employee independently plans own work, coordinates with other engineers or subject-matter specialists, resolves problems, and carries assignments through to completion. Work is normally accepted as technically accurate but subjected to review upon completion for achievement of objectives, conformance to policy, and compatibility with the work of other functional elements of the organization.

Factor 3, Guidelines -- Level 3-3 -- 275 Points

Guidelines include engineering manuals, agency regulations, applicable codes, manufacturers' catalogs, publications of professional societies, and higher headquarters policy and program

directives. The employee uses judgment and ingenuity to implement policies and program materials since such guidelines are generally quite broad and do not provide adequate coverage of installation facilities and activities. The employee also applies judgment and initiative in selecting among alternative approaches and applying standard methods and techniques to solve varied technical and socio-economic problems such as those due to limited funds or need to modify a facility to accommodate increased loads or to comply with stricter standards.

Factor 4, Complexity -- Level 4-4 -- 225 Points

Assignments involve the interpretation and implementation of policy and program directives that generally require supplementation to provide adequate coverage for a range of subjects involving public safety and welfare and the protection of natural resources that are found at the installation. Individual assignments typically involve several complex features, including difficult economic and scheduling as well as technical problems such as those which are associated with strict control of water and other resources to achieve and sustain a clean and healthful environment.

Factor 5, Scope and Effect -- Level 5-3 -- 150 Points

The purpose of the position is to implement and administer programs affecting public safety and welfare and the natural resources of a military installation. Results of the work affect the working and living environment and the safety and health of installation occupants. In addition, the mployee's recommendations and decisions impact the installation's engineering program, especially the need to alter and modernize existing facilities and recognize the ecological and environmental aspects of the installation's facilities, systems, or activities.

Factor 6, Personal Contacts -- Level 6-3 -- 60 Points

Intra-agency contacts include other engineers, procurement personnel, officials and managers of the facilities, and subject-matter experts from command and agency headquarters. Additional contacts include architect-engineer firms, construction contractors, fellow members of professional organizations, manufacturers, and engineers and officials within the immediate local community, the county and state, and other Federal agencies having regulatory and enforcement authority concerning installation activities that affect on- and nearby off-base natural resources of water, land, and air.

Factor 7, Purpose of Contacts -- Level 7-3 -- 120 Points

Contacts are to coordinate projects, discuss needs of the user, discuss designs and specifications, and monitor contracts which often involve technical disagreements. Contacts are also to justify work proposals to command and agency officials and to keep abreast of the state-of-the-art.

Factor 8, Physical Demands -- Level 8-1 -- 5 Points

Most of the work is sedentary although there is walking and bending during on-site inspections of installation facilities.

Factor 9, Work Environment -- Level 9-1 -- 5 Points

Most of the work is performed in an office setting although there is occasional exposure to conditions wherein facilities are undergoing modification, improvement, or alteration.

TOTAL POINTS -- 2540

ENVIRONMENTAL ENGINEER, GS-0819-11, BMK #3

Duties

Serves as an environmental engineer on the staff of a regional office of a regulatory and enforcement agency with responsibility for coordinating the activities of one of a number of states comprising the region concerning the development of plans and designs for the construction or modification of municipal waste water treatment facilities funded (or to be funded) by Federal grants. The assignment typically (a) pertains to facilities (employing the activated sludge or trickling filter process) that are dispersed throughout the state but generally in areas with problems in controlling water quality, (b) involves approximately 50 different projects at different stages of completion (i.e., planning, design, or construction stage) and of varied scope and magnitude, e.g., installation of new or expansion of existing interceptor sewer systems, construction of new or modification of existing pumping stations, or construction of new or expansion of existing plants, several of which are capable of processing 50 million or more gallons a day, and (c) involves state prepared or certified plans which include: cost effective analysis, comparing biological, physical-chemical, and land disposal processes for use in selecting most efficient treatment; alterations for advanced sewage systems including an analysis of possible nterceptor connections to other municipal systems; alternative sites and service areas; assessment of effects of proposed facility on air, land, water, and other resources; a cost analysis of all facility components including rainwater collection systems; and (for high-cost projects) an analysis of facility's compatibility with land use and transportation needs; maps showing all connecting interceptors, sewer lines, and other treatment works and systems; and an areawide assessment of the nature and extent of all types of water pollution.

-- Confers with state regulatory agency to advise on legislation, regulations, and policies governing nature and scope of facilities authorized for the technical standards, procedures, and controls under which grants can be approved; and, ensures that facilities being planned are consistent with areawide and river basin planning.

-- Analyzes state applications for conformance with regional or agency criteria and to insure that engineering data is complete and cost effective insofar as resources, social, environmental, and economic conditions are concerned, reviewing such data as

infiltration/inflow analyses and recommending approval, approval with modification, or disapproval.

-- Confers with other regional staff members to coordinate grant proposals and discuss technical aspects of construction grant applications. Confers with state and municipal officials and consulting engineers to advise on errors, omissions, or deviations.

-- Monitors progress of individual projects after grant has been made (e.g., review of designs and specifications, announcement of bid opening, analysis of bids, awarding of contract for design and/or construction, preparation of operation and maintenance manuals), initiating correspondence and/or conducting conferences to clarify and resolve engineering and administrative matters that arise.

-- Reviews contract change orders for conformance with regional standards and requirements.

-- Inspects facilities during and upon completion of construction, considering amount of construction completed and conformance with plans, designs and specifications. Orders correction of deficiencies, preparing reports with recommendations of approval or disapproval of partial or final payment.

-- Reviews grant applications involving joint funding with, or individual funding by, other Federal agencies, determining adequacy of engineering proposals and compliance with regulatory requirements. Recommends approval or disapproval.

Factor 1, Knowledge Required by the Position -- Level 1-7 -- 1250 Points

-- Knowledge of professional environmental engineering concepts, principles, and practices applicable to the full range of duties concerned with assessing and advising on the adequacy of plans and designs for the construction or improvement of secondary waste water treatment facilitie for municipalities within one of several states comprising the region to which assigned.

-- Knowledge and skill to adapt standard practices, equipment, or techniques during the review of plans, designs, or specifications (normally developed by consulting engineering firms) or during or upon completion of actual construction by contractors.

-- Familiarity with related engineering disciplines such as mechanical and electrical.

-- Knowledge and skill to assess the impact of the facility construction activities on public safety, ecology, and environment involving matters directly related to welfare and protection of natural resources.

Factor 2, Supervisory Controls --Level 2-4--450 Points

Supervisor makes assignment in the form of responsibility for the program in a specific state together with broad functional responsibilities and broad overall objectives. Individual projects or work to be done is largely dependent on submission of applications by the state to which assigned. Priorities and deadlines for the completion of work are established by the employee in consultation with the supervisor. The employee independently plans own work, coordinates with other engineers or subject-matter specialists, resolves problems, and carries assignments through to completion. Work is normally accepted as technically accurate but subjected to review upon completion for achievement of objectives, conformance with policy, and compatibility with the work of other engineers within the office.

Factor 3, Guidelines -- Level 3-3 -- 275 Points

Guidelines include agency and regional policies and regulations, standard technical literature, established effluent or water quality standards for municipal waste water treatment facilities, agency and regional technical publications, precedents and practices in the field of water pollution control and the design, construction, maintenance and operation of waste treatment plants. Due to the varied characteristics, scope and magnitude of waste water treatment facilities involved and the different effluent standards established for varied geographical areas the employee uses judgment in selecting, interpreting and applying guidelines, making compromises when necessary. The employee exercises judgment in coordinating the construction grant program for the state to which assigned, advising state officials on the interpretation and application of agency and regional policy and regulations; and, the application of standard practices to new situations or in relating precedents to situations with comparable but conflicting issues.

Factor 4, Complexity -- Level 4-4 -- 225 Points

Assignments involve waste water treatment facilities of varied scope and magnitude that are being proposed for or already exist in different municipalities of a state but generally in areas with problems in controlling water quality. Generally, individual facilities will consist of several complex features that are both technical and socio-economic in nature, e.g., obscure design criteria, conflicts between engineering and state or local requirements, and other features associated with a specific plan or design, type of facility, or installation location.

Factor 5, Scope and Effect -- Level 5-4 -- 225 Points

The purpose of the position is to provide a technical specialist to coordinate the activities of a specific state concerning the development of plans and designs for the construction of municipal waste water treatment facilities (of varied scope and magnitude) funded (or to be funded) by Federal grants. Results of the employee's work affect the working and living environment and the safety and health of the residents within the municipalities of the state to which assigned. In addition, the employee's recommendations and decisions have a significant impact on the state's

water quality program, especially the need for new or the alteration and modernization of existing waste water treatment facilities and the ecological and environmental aspects of such facilities.

Factor 6, Personal Contacts -- Level 6-3 -- 60 Points

Personal contacts include other engineers and subject-matter specialists of the regional headquarters, officials and managers of municipal facilities, officials and subject-matter specialists of the state's water quality agency, architect engineers, construction contractors, and engineers and officials of various municipalities and counties and of other Federal agencies.

Factor 7, Purpose of Contacts -- Level 7-3 -- 120 Points

Contacts are established to: (a) discuss and render advice on the adequacy of preliminary plans and designs for, and the actual construction of new or improved waste water treatment facilities for varied municipalities within a state; (b) explain requirements and provisions of the construction grant program, advise on planning and application of funds, and develop the state's capability to assume specific phases of the construction grant program as may be delegated, i.e., preparation of operation and maintenance manuals or review and certification of architect engineering plans and specifications; and (c) insure satisfactory progress of construction and compliance with contract and grant provisions. Such contacts frequently pertain to justifying use of different approaches, techniques, or processes and resolving conflicting technical, financial or socio-economic issues between state officials, municipalities, and consultant engineers.

Factor 8, Physical Demands -- Level 8-2 -- 20 Points

Work is sedentary except during regular and recurring construction-site inspections which are generally conducted in a "hard-hat" area requiring walking, bending, climbing, and stooping to get in and out of manholes and pump station wet wells.

Factor 9, Work Environment -- Level 9-3 -- 50 Points

Work is usually performed in an office setting although there is regular and recurring exposure to unfavorable conditions during construction-site inspections such as areas adjacent to tanks devoid of oxygen, containing bacteria or emitting hydrogen sulfide.

TOTAL POINTS -- 2675

ENVIRONMENTAL ENGINEER, GS-0819-11, BMK #4

Duties

Serves as an environmental engineer on the staff of a facility engineering division for a military department with responsibility for the planning, design, construction, effective maintenance and operation of individual environmental engineering facilities at any of a number of subordinate installations within a multi-state area. Assignments pertain to (a) the improvement or modification of such facilities as domestic sewage treatment systems employing chemical or biological processes; industrial waste treatment (or pretreatment) systems employing physical-chemical processes; pumping stations and sewer systems; and water supply, distribution, and storage systems; air pollution control systems, including vapor recovery systems; emission control systems for sandblast operations; painting operations; surface treatment, involving use of solvents; boiler plants and firefighting schools; and, (b) investigations or studies of such environmental engineering program elements as acquisition of potable water or disposal of domestic or industrial waste by regional agreement with local municipalities; chemical treatment of potable and industrial water supplies; control of galvanic and electrolytic corrosion in boilers, water storage tanks, and cooling towers; collection, recycling, and disposal of trash via contract or use of Federally owned landfills and incinerators; disposal of sewage sludge; sanitation of swimming pools, lakes, and other recreational areas; control of air pollution as affected, for example, by power plants, incinerators, and fuel handling and transfer facilities.

-- Visits installations to inspect existing facilities, writing report on maintenance and operating procedures used, any unsanitary conditions noted, and need for current or future modification or improvement.

-- Develops design parameters and prepares project justifications and specifications for the development of plans and designs, maintaining close liaison with architect-engineering firm or in-house design staff to assure that environmental engineering requirements are satisfied.

-- Conducts pollution surveys involving field studies and laboratory analyses to identify type and amount of effluent or emission being discharged, recommending appropriate action to comply with established standards.

-- Visits installations to resolve problems requiring investigation of unsanitary or questionable conditions, analyzing source and cause, and recommending appropriate

action to correct undesirable conditions such as maintenance or operational difficulties (e.g., a water system having excess manganese or high turbidity), excessive costs, inadequate discharge.

-- Arranges for disposal of solid waste, identifying composition and character and determining appropriate methods of handling and compressing waste as well as economy of recycling metal, wood, or paper. Selects most satisfactory means of disposal (contract or Federally owned landfill or incinerator) considering such factors as site location, cost, soil characteristics, engineering and maintenance feasibility, and suitability of facility.

-- Reviews, evaluates and prescribes tests and testing methods for potability of drinking water, type and quantity of effluent or emission, quality of boiler feedwater. Performs or directs performance of such tests to solve problems such as claims by Federal, state, or local regulatory or enforcement activities.

-- Confers with installation officials, subject-matter specialists, and operating personnel concerning such matters as necessity to cooperate with local, state, and Federal regulatory enforcement agencies; adequacy of boiler feedwater treatment to mitigate boiler scale formation and steam line corrosion; adequacy of installation's pollution controls concerning processing methods and pollutant removal material or equipment; and quantity and nature of domestic or industrial waste and the treatment necessary to meet Federal, state or local standards.

-- Confers with subject-matter specialists of Federal and state regulatory and enforcement agencies to discuss pollution control standards and actions (proposed or already in progress) needed to conform with such standards.

Factor 1, Knowledge Required by the Position -- Level 1-7 -- 1250 Points

-- Knowledge of professional environmental engineering concepts, principles, and practices applicable to a full range of duties concerned with the operation, maintenance, and improvement of environmental engineering facilities (i.e., pumping stations, sewer systems and domestic and industrial waste treatment systems, and water supply, distribution and storage systems) and the implementation and compliance with related programs on the part of individual military installations within a specific geographical area.

-- Knowledge and skill to adapt standard practices, equipment, or techniques in establishing design parameters and preparing project justifications and specifications for the development of plans and designs to improve or alter existing facilities.

-- Familiarity with related engineering disciplines such as mechanical and electrical.

-- Knowledge and skill to assess the impact of installations' activities on public safety, ecology, and environment involving matters directly or closely related to public welfare and protection of natural resources.

Factor 2, Supervisory Controls -- Level 2-3 -- 275 Points

Supervisor makes assignments in the form of individual projects or work to be done together with overall objectives, priorities and deadlines. The employee independently plans own work, coordinates with other engineers or subject-matter specialists, resolves most problems, and carries assignments through to completion. The supervisor or higher grade engineer is available to render advice on or technically review unusual or especially difficult problems that are clearly precedential in nature. In such instances the employee refers such problems together with a proposed plan of action to the supervisor or higher grade engineer. Work is normally subjected to review upon completion for technical soundness, achievement of objectives, conformance with policy, and compatibility with the work of other subject-matter specialists.

Factor 3, Guidelines -- Level 3-3 -- 275 Points

Guidelines consist of agency engineering manuals and publications; textbooks; local, state, and Federal codes and standards; manufacturers' catalogs; publications of professional societies; and agency policy and program directives. The employee is expected to be thoroughly familiar with such guidelines and be able to interpret them and apply precedents and experience to new situations. Judgment and originality are required to correlate theoretical considerations with experience to evolve engineering compromises and to plan and coordinate action promptly to assure efficient and technically adequate facilities.

Factor 4, Complexity -- Level 4-4 -- 225 Points

Assignments involve conventional (and occasionally, unconventional) aspects of environmental engineering concerning the effective maintenance, operation, modification or improvement of industrial and waste water disposal and water supply facilities. Individual assignments involve a ombination of 2-5 complex features that generally vary from one installation to another in scope or magnitude, requiring the employee to use different approaches. Technical issues encountered fall within the state-of-the-art.

Factor 5, Scope and Effect -- Level 5-3 -- 150 Points

The purpose of the position is to assure effective maintenance, operation, modification, or improvement of environmental engineering facilities and the protection of natural resources (e.g., water and air) at any of forty military installations within a 24 state area. Results of the work affect the working and living environment and the safety and health of occupants of the installations concerned. In addition, the employee's recommendations and decisions impact the facility engineering division's environmental engineering program, especially in terms of the need

for alteration and modernization of existing facilities and the ecological and environmental aspects of activities within the varied installations.

Factor 6, Personal Contacts -- Level 6-3 -- 60 Points

Contacts are with officials, engineers, and plant operating personnel within the department, architect-engineers and contractors, and representatives of Federal, state, and municipal regulatory and enforcement agencies.

Factor 7, Purpose of Contacts -- Level 7-3 -- 120 Points

Contacts are to explain the purpose and functions of the engineering program; conduct surveys and investigations; resolve specific engineering problems; develop factual data to base recommendations and decisions on issues where there are conflicting interest and opinions; justify feasibility and desirability of modifying existing facilities; and arrange for joint agreements to use municipal services.

Factor 8, Physical Demands -- Level 8-1 -- 5 Points

Sedentary.

Factor 9, Work Environment -- Level 9-1 -- 5 Points

Work is performed primarily in an office setting although there is some travel to installations to conduct inspections, investigations, surveys, and studies.

TOTAL POINTS -- 2365

ENVIRONMENTAL ENGINEER, GS-0819-11, BMK #5

Duties

Serves as an environmental engineer within a district office of a military department's construction-engineering office with responsibility for the design of industrial and domestic waste treatment facilities, pumping stations and sewer systems, and water supply, distribution, and storage facilities. Assignments (a) involve environmental engineering facilities that are normally found on military and other government installations, (b) normally pertain to large, complex projects such as industrial waste treatment or pretreatment systems employing physical-chemical processes or domestic sewage treatment systems employing biological and chemical processes, e.g., activated sludge or trickling filter, and (c) concern improvement to or extension of existing or construction of new facilities and systems.

-- Visits work sites to investigate existing equipment layout and environmental conditions.

-- Evaluates existing facilities or systems and components, making calculations (e.g., to determine pressures or pressure losses) and determining types of processes, equipment, or components needed to improve existing conditions. Sizes equipment according to needs, ensuring conformance with agency standards.

-- Prepares original designs and preliminary and final layout of systems, equipment, and components, considering size, space, capacities, and economy.

-- Reviews design directives, available criteria, and basic data to determine character, uses, and special features of projects, e.g., chemical nature of waste water, or location, size, quantities, and spacing of pumps, pipes, valves, hydrants, reservoirs, and elevated or ground storage tanks, and routing of sewer mains.

-- Reviews architect-engineer designs and specifications for conformance with contractual requirements, economy and feasibility of design, accuracy of design, and adequacy of type, size, and capacity of components, recommending changes to effect greater economy, more efficient layout, and similar benefits.

-- Coordinates projects with other engineers and subject-matter specialists within district office when designs involve expertise in other functional elements.

-- Participates in final on-site inspections.

Factor 1, Knowledge Required by the Position -- Level 1-7, 1250 Points

-- Knowledge of professional environmental engineering concepts, principles, and practices applicable to the full range of engineering duties concerned with the design and layout of industrial and domestic waste treatment facilities, pumping stations, sewer systems, and water supply, distribution, and storage facilities.

-- Knowledge and skill to design waste and sewage collection systems, treatment and disposal systems, and water supply, treatment, storage, and distribution systems such as would be acquired through a bachelor's degree program supplemented by several years experience in the design of such systems.

Factor 2, Supervisory Controls -- Level 2-4 -- 450 Points

Supervisor makes assignments in the form of individual projects and broad overall objectives. Priorities and deadlines for completion of such projects are normally established by the employee in consultation with the supervisor. The employee independently plans own work, coordinates with other engineers and subject matter specialists, resolves problems, and carries assignments through to completion. Work is normally accepted as technically accurate but reviewed upon completion for achievement of objectives and compatibility with the work of other engineers within the office.

Factor 3, Guidelines -- Level 3-3 -- 275 Points

Guidelines consist of agency engineering manuals and publications; textbooks; local, state, and Federal codes and standards; manufacturers' catalogs; and agency policy and program directives. Projects require the employee to select, adapt and apply engineering principles and concepts due to the varied characteristics of the waste and water facilities and systems and the different environmental conditions involved in individual projects. The employee exercises judgment and initiative in applying and adapting standard practices to new situations and in relating precedents to situations with comparable but conflicting issues.

Factor 4, Complexity -- Level 4-4 -- 225 Points

Assignments usually pertain to the modification of diverse domestic and industrial waste water treatment and water supply, distribution, and storage facilities typically found on military and other government installations. Individual assignments generally involve a combination of several complex features, requiring modification or adaptation of conventional practices and design criteria. The employee also recognizes the relationships of problems and practices of related engineering fields and either solves problems or refers them to an appropriate functional element of the district office for resolution.

Factor 5, Scope and Effect -- Level 5-3 -- 150 Points

The purpose of the position is to perform engineering design work for the construction of new or the improvement or modification of existing waste and sewage collection systems, treatment and disposal systems, and water supply, treatment, storage, and distribution systems. The employee's work has an impact on the safety, economy, efficiency, type and size of such facilities or systems.

Factor 6, Personal Contacts -- Level 6-3 -- 60 Points

Contacts are with agency field project personnel, other engineers and subject matter specialists within the district office, architect-engineers, contractors, and manufacturers' representatives.

Factor 7, Purpose of Contacts -- Level 7-2 -- 50 Points

Contacts are for the purpose of giving and receiving information, coordinating work efforts, and resolving technical problems involving individual projects. Other contacts are to obtain advice on or resolve problems concerning equipment and processes.

Factor 8, Physical Demands -- Level 8-1 -- 5 Points

Work is chiefly sedentary with some minor physical activity during construction site visits.

Factor 9, Work Environment -- Level 9-1 -- 5 Points

Work, for the most part, is usually performed in an office setting although there is occasional exposure to conditions in or adjacent to domestic and industrial waste or water treatment facilities or systems undergoing construction or modification.

TOTAL POINTS -- 2470

ENVIRONMENTAL ENGINEER, GS-0819-11, BMK #6

Duties

Serves as an environmental engineer on the staff of a regional office of a regulatory and enforcement agency with responsibility for evaluating the adequacy of the air pollution control program and activities of one of a number of states comprising the region. The assignment typically (1) pertains to the reduction of the quantity of pollutants in the ambient air, as generated by stationary sources, to levels adequate to protect public health and welfare, (2) entails inspections of major air pollution point sources within assigned state and/or providing for and monitoring contractor support for the conduct of inspections or technical-engineering studies concerning probable non-compliance of specific plant-type activities with established legal requirements, (3) primarily concerns suspended particulates and sulfur oxides but may include other criteria pollutants (e.g., nitrogen oxides, carbon monoxide, photo-chemical oxidents, hydrocarbons) or non-criteria or hazardous material such as mercury, lead, beryllium, asbestos, or toxic substances, and (4) includes as many as 500 major point sources involving such industrial processes as coal-, oil-, or gas-fired power plants, petroleum refineries, primary smelters, asphalt and concrete plants, coke plants, and manufacturing firms.

-- Evaluates state's air pollution control program, identifies factors affecting progress to achieve established objectives or noncompliance of specific plants with established legal requirements and renders advice to resolve specific problems, e.g., need for new or revised state statutes, appropriate method for removal of pollutants from stack effluents, improvements to industrial process or control methods to increase efficiency of emission control method, extent to which existing control and treatment systems affect or fail to affect the quality of air resources, or disposition of suits against violators of discharge permits.

-- Researches technical literature and reports to familiarize self with processes peculiar to a given industry and to keep abreast of new air pollution control equipment, techniques, and processes.

-- Evaluates pollution control plans for new plants for compliance with established standards; and, proposed emission control methods for removal of undesirable gases from flue effluent.

-- Inspects, normally as a leader of a team, industrial sources to observe actual operations and gather facts to evaluate performance of air pollution control operations, searching for any of a variety of devices controlling air emissions and evaluating efficiency of such devices. Prepares emission calculations based on material balance, equipment control device efficiency, and/or established emission factors, writing report of findings together with reasons for failure to comply with established standards and remedial actions to correct such failures.

-- Develops technical input for lawyers, preparing abatement requirements, procedures, and schedules for administrative orders and consent decrees and serving (when required) as an expert witness in enforcement action cases.

-- Arranges for contractor to conduct inspection or technical-engineering studies to determine source and cause of noncompliance with established air quality standards, coordinating results with appropriate state officials for possible further assistance from the Federal government.

-- Responds to inquiries from state officials, citizens, or representatives of industrial plants concerning the interpretation and application of policy directives and regulations pertinent to the agency's national stationary source air enforcement program. Responds to congressional inquiries and requests from agency headquarters concerning status of the air pollution program or findings pertinent to specific industrial plants within the state to which assigned.

-- Makes presentations or briefings on the compliance status and abatement efforts of the state to which assigned (or individual plants thereof) together with recommendations for improvement.

Factor 1, Knowledge Required by the Position -- Level 1-7 -- 1250 Points

-- Knowledge of professional environmental engineering concepts, principles, and practices concerned with the control of reduction of the quantity of pollutants in the air, as generated by stationary sources, to levels adequate to protect public health and welfare. Included are knowledge of:

- **!** Standard pollutants (e.g., suspended particulates, sulfur oxides) and standard methods of control (e.g., stack gas cleaning techniques, flu gas desulfurization) for a variety of industries and process operations.

- **!** Instrumentation and apparatus (e.g., opacity meters, hi-volume samplers) for measuring pollutants generated by stationary sources.

- **!** Methods of controlling emissions from combustion processes, e.g., bag house type particulate collectors, packed towers, scrubbers, settling chambers, after burners, inertial

separators, fabric filters, mechanical or electrostatic precipitators, cyclone or centrifugal collectors, and baffles.

-- Knowledge of the processes peculiar to any one of a number of different industries and skill to make engineering-economic evaluations of proposed pollution control methods and plans; to adapt standard practices and techniques; and to recognize discrepancies and deviations.

Factor 2, Supervisory Controls -- Level 2-3 -- 275 Points

Supervisor makes initial assignment in the form of responsibility for a specific state together with instructions concerning functions, pertinent objectives, and policies. Follow-on assignments such as industrial source inspections together with deadlines or priorities are established by the employee in consultation with the supervisor or employee of higher grade. The employee plans own work, coordinates with other engineers or subject-matter specialists, and carries assignments through to completion. Unusual problems, controversial issues, or matters that affect policy are referred to the supervisor or higher grade engineer who provides additional guidance and instruction. Work is judged for soundness of professional and technical judgments reflected in accomplishments.

Factor 3, Guidelines -- Level 3-3 -- 275 Points

Guidelines include agency and regional policies and regulations, standard technical literature, established ambient air quality standards for stationary sources, manufacturers' catalogs, agency and regional technical publications, precedents and practices in the field of air pollution control. The engineer adapts guidelines because of the varied characteristics of stationary sources and the different emission standards established for varied geographical areas. The employee exercises judgment in advising state officials and representatives of industrial plants on the interpretation and application of agency policy and regulations; and, the application or adaptation of standard practices to new situations or in relating precedents to situations with comparable but conflicting issues.

Factor 4, Complexity -- Level 4-4 -- 225 Points

Assignments involve a number of air pollution control devices that are typically found on or required for large industrial-type plants to measure and control the quantity of pollutants discharged into the air.

Control technology generally differs for each type of pollutant but is applicable to a range of different industrial type plants. Technical considerations involving the measurement and control of pollutants while normally within the state-of-the-art entail adapting or extending standard techniques since stationary sources involve varied characteristics. The employee independently

selects, adapts, and applies varied engineering principles, guidelines, and approaches and also makes engineering-economic assessments of proposed pollution control methods and plans for new sources involving novel control systems and equipment.

Factor 5, Scope and Effect -- Level 5-3 -- 150 Points

Purpose of the position is to evaluate the adequacy of a state's air pollution control or abatement program and activities by inspecting (or arranging for the inspection of) major point sources within the state. Involved are technical and administrative issues on a case-by-case basis that may lead to possible litigation against major industrial concerns for non-compliance with established standards.

Factor 6, Personal Contacts -- Level 6-3 -- 60 Points

Personal contacts are with engineers and other subject matter specialists including lawyers within the regional headquarters, contractors, equipment manufacturers, state officials and subject matter specialists, and officials or subject matter specialists of varied large industrial concerns.

Factor 7, Purpose of Contacts -- Level 7-2 -- 50 Points

Contacts are made to plan for and coordinate individual inspections of large industrial type plants, discuss and assess adequacy of a state's air pollution control program and activities, advise state and industrial representatives of the need for (and findings resulting from) individual inspections and requirements to conform with legal statutes, and provide technical information for inclusion in administrative orders or consent decrees.

Factor 8, Physical Demands -- Level 8-2 -- 20 Points

The work requires frequent and recurring inspections of large industrial-type plants where there is considerable walking, climbing, stooping, and bending.

Factor 9, Work Environment -- Level 9-3 -- 50 Points

Inspection of certain plants (e.g., coke plant) entails use of safety glasses, respirator, fire retardant clothing and special shoes, whereas other plants require working on scaffolds at heights of 30 to 60 meters (100 to 200 feet) above ground under such adverse conditions as varied temperatures, terminal winds, rain or thunderstorms, and stack emissions.

TOTAL POINTS -- 2355

ENVIRONMENTAL ENGINEER, GS-0819-12, BMK #1

Duties

Serves as an environmental engineer on the staff of a regulatory and enforcement agency with responsibility for advising two of ten regions on the interpretation and implementation of (and compliance with) agency directives and regulations concerning the national stationary source air enforcement program. The assignment (1) pertains to the reduction of the quantity of pollutants in the ambient air, as generated by stationary sources, to levels adequate to protect public health and welfare, (2) includes the conduct of nationwide studies of major air pollution point sources involving one or more industries, (3) primarily concerns suspended particulates and sulfur oxides but may include such other pollutants as nitrogen oxide, carbon monoxide, photo-chemical oxidents, or hydro-carbons which in certain concentrations are individually deemed harmful to health and welfare, and (4) involves such industrial processes as coal-, oil-, or gas-fired power lants; petroleum refineries; primary smelters; asphalt, concrete, or cement plants

-- Responds to inquiries from assigned regions concerning the interpretation and application of policy directives and regulations pertinent to agency's national stationary source air enforcement program.

-- Analyzes status of agency's program within assigned regions, identifying factors affecting progress or non-compliance and rendering advice for the development of appropriate strategies to resolve specific problems, e.g., appropriate method for removal of pollutants from stack effluents, improvements to industrial processes or control methods to increase efficiency of emission control method, extent to which existing control and treatment systems affect or fail to affect the quality of air resources, or disposition of suits against violators of discharge permits.

-- Arranges for contractor to conduct technical-engineering studies for assigned regions to determine, for example, source and cause of non-compliance with national ambient air quality standards, monitoring progress and coordinating results with appropriate region for possible further engineering or technical assistance.

-- Analyzes compliance status of stationary sources within assigned regions to determine whether there is wide-spread non-compliance and whether non-compliance is indicative of local enforcement problems or more general problems with the national program. Develops strategies to correct problems, coordinating with appropriate region and (where appropriate) arranging for contractor to conduct study.

-- Conducts nation-wide surveys of major pollution point sources involving a specific industry to determine compliance status with state implementation plans, Federal source performance standards, and national emission standards, determining reasons for non-compliance and developing solutions to problems.

-- Reviews trade journals, news releases, and technical reports to identify new technical or economic developments that would affect agency's enforcement program, informing supervisor of those that are considered significant. Makes engineering-economic evaluations of pollution control plans for new plants for compliance with specific

standards; and, proposed emission control methods for removal of undesirable gases from flue effluent.

-- Makes presentations or briefings on the compliance status and abatement efforts within assigned regions or industries together with recommendations for improvement.

Factor 1, Knowledge Required by the Position -- Level 1-8 -- 1550 Points

Mastery of concepts, principles, and practices of environmental engineering that enables the employee to serve as a technical specialist in the control or reduction of pollutants as generated by stationary sources.

Knowledge and skill to evaluate and incorporate the latest developments in the field for use within the regions to which assigned or elsewhere within the agency.

Knowledge of processes peculiar to a number of different industries and skill to make engineering-economic evaluations of proposed pollution control methods and plans; to adapt standard practices and techniques; and to recognize and resolve discrepancies and deviations in the programs and activities of regions to which assigned.

Factor 2, Supervisory Controls -- Level 2-4 -- 450 Points

Supervisor makes initial assignments in the form of responsibility for specific regions and industries together with operational requirements. Work to be done, objectives and policies are established by the employee in consultation with the supervisor. The employee independently plans own work, coordinates with other engineers or subject-matter specialists, resolves technical or administrative problems, and carries assignments through to completion. The employee renders advice independently but keeps supervisor informed on major or controversial issues. Completed work and technical decisions or recommendations are accepted as technically sound but reviewed for conformance with policy and program objectives, budgetary considerations, and compatibility with work of other specialists serving other regions of the agency.

Factor 3, Guidelines -- Level 3-4 -- 450 Points

Guidelines include agency policies and regulations, standard technical literature, established ambient air quality standards for stationary sources, manufacturers' catalogs, precedents and practices in the field of air pollution control. The employee uses initiative and judgment in selecting, adapting and applying pertinent guidelines. In addition, the employee uses ingenuity and resourcefulness in deviating from or extending established methods or techniques in those situations where guidelines are not completely applicable due to the varied characteristics of stationary sources and the different emission standards for varied geographical areas. The employee also exercises judgment in advising regional offices on: the applicability of agency policy and regulations, and, the application, adaptation of, or the need to deviate from or extend

standard practices to new situations or relate precedents to situations with comparable but conflicting issues.

Factor 4, Complexity -- Level 4-4 -- 225 Points

Assignments involve a full range of air pollution control devices and techniques that are typically found on or required for large industrial-type plants (e.g., power plants, refineries, smelters) to measure and control the quantity of pollutants discharged into the air. Control technology generally differs for each type pollutant but is applicable to a range of different industrial type plants. Technical considerations involving the measurement and control of pollutants, while normally within the state-of-the-art, entail adapting or extending standard techniques since stationary sources involve varied characteristics for which standard methods are not directly applicable. The employee also makes engineering economic assessments of proposed pollution control methods and plans for new sources involving novel systems and equipment.

Factor 5, Scope and Effect -- Level 5-4 -- 225 Points

Purpose of the position is to provide a technical specialist in the control of air pollution generated by large, industrial type stationary sources to advise assigned regions on specific problems that fall under the agency's national stationary source air enforcement program. Involved are technical and administrative issues on a case-by-case basis that may lead to possible litigation against major industrial concerns for non-compliance with established standards.

Factor 6, Personal Contacts -- Level 6-3 -- 60 Points

Personal contacts are with employees (engineers and other subject-matter specialists including lawyers) or agency headquarters and regional offices as well as contractor representatives. Contacts also include officials and subject-matter specialists of state air quality control agencies.

Factor 7, Purpose of Contacts -- Level 7-3 -- 120 Points

Contacts are to advise on and discuss problems confronting assigned regions, monitor contractual effort involving technical-engineering studies of industrial practices and processes and their non-compliance with Federal clean air standards, and coordinate technical-engineering issues with lawyers to assure legal sufficiency for possible litigation suits. Such contacts generally involve problems about which there are conflicting interests and opinions among individuals who are also technical specialists, including those of private industry.

Factor 8, Physical Demands -- Level 8-1 -- 5 Points

The work is sedentary in nature.

Factor 9, Work Environment -- Level 9-1 -- 5 Points

Most of the work is in an office setting although there may be occasional travel to regional offices.

TOTAL POINTS -- 3090

ENVIRONMENTAL ENGINEER, GS-0819-12, BMK #2

Duties

Serves as one of several environmental engineers on the staff of a centralized activity of a major command within a military department with responsibility for planning, design, construction, effective operation and maintenance of individual environmental engineering facilities associated with military installations, and operations. Assignments (1) pertain to problems encountered by military installations, ships, and operations in achieving compliance with Federal, state, and local environmental control regulations (e.g., water, air, solid waste, and noise) and insuring that health and welfare aspect of environmental pollution control are adequately protected, (2) involve full range of domestic and industrial waste water treatment and disposal and water supply facilities that are normally found at field level installations and on board ships of a military department; air pollution control program facilities and procedures; solid and toxic water disposal and recycling; and sound suppression and attenuation techniques, (3) include preparation and updating of inventories of pollutants emitted to water, atmosphere or land from military installations and operations; monitoring programs and studies as necessary to determine whether emissions violate applicable regulations or constitute a health hazard to an installation or adjacent civilian communities and to determine necessary corrective measures or procedures for the environmental deficiencies; coordination of action required for funding, design, construction and operation of the corrective measures within the time-frame required; and preparation of guidelines or instructions as required to insure compliance with environmental regulations, (4) involve studies to evaluate potential pollution sources, e.g., storage and handling facilities for oil and hazardous chemicals; initiation of corrective measures required to prevent or counteract pollution potential; studies to predict impact of proposed military operations on the environment; and preparation of contingency plans, and (5) involve programs directly or indirectly related to environmental engineering such as ship-to-shore sewage, oil and solid waste offload programs; oil spill recovery programs; water supply resources management; boiler and cooling tower water treatment; chemical and biological treatment and disposal of domestic and industrial waste via on-base facilities or regional agreement with local municipal or county governments; treatment and disposal of toxic chemical waste generated at military installations and on-board ships; collection, disposal and recycling of trash and refuse; sanitation of swimming pools.

-- Conducts environmental pollution control surveys of military installations and operations to investigate (1) compliance with applicable standards for waste water treatment and disposal; potable water supply; control of emission of pollutants to the atmosphere; solid waste disposal and recycling procedures, and noise suppression and attenuation measures; prevention and countermeasures for potential pollution source; disposal of hazardous toxic

wastes, and (2) adequacy of treatment and/or disinfection of water supply for drinking purposes; sufficiency of sanitation of swimming pools, lakes and other recreational areas.

-- Assures command and installation compliance with established standards by performing the following tasks:

! Conducts comprehensive engineering studies to determine the most feasible corrective measures for various environmental deficiencies (e.g., achieve compliance for industrial waste discharges from shipyard drydocks by initiation of costly cleanup procedures and process modification interfering with productivity versus installation of complex collection and treatment systems for liquid and solid waste generated from the overhaul and repair of ships, or bring open sandblast operations of large objects in compliance by changing abrasive and operation procedures versus construction of large enclosures with exhaust control, or assure compliance of volatile fuel handling and storage facilities by installation of vapor recovery systems versus installation of floating roof and other vapor displacement modification). Recommends appropriate action to comply with applicable regulations, including preparation of project documents and justifications.

! Represents the pertinent installations during (1) negotiations with regulatory agencies to establish achievable and timely compliance dates, (2) public hearings when required, for establishment of compliance dates, (3) negotiations with municipal sewer agencies for disposal of domestic or industrial waste with or without pretreatment, and (4) regional planning and advisory committee meetings concerning waste water treatment and disposal, solid waste management, air pollution strategy and emergency actions, ground water management, and oil or hazardous spill contingency plans to insure that the interests of the installations represented are adequately considered.

! Provides necessary coordination and review of pollution abatement projects to insure (1) that projects are funded, designed and constructed in timely manner (it often involves briefing at higher command levels), (2) that all provisions are included in the design and construction to assure compliance, (3) that adequate and competent staffing of the facilities are budgeted for and available when operation starts, and (4) that complete operation and maintenance instructions are available for the operators of the facilities.

! Reviews military construction projects and provides comments as necessary to insure that necessary provisions to meet applicable or potential environmental standards are included.

! Advises installations on new environmental regulations having an impact on operations including (1) evaluation of impact on installation equipment and operations, (2) preparation of inventories of pollution sources affected, and (3) preparation and coordination of new pollution abatement projects required, or preparation of guideline

for new operational modes required, e. g., change of fuels for combustion processes, change of solvents for surface treatment operations or dry cleaning facilities, improvements in waste water or water supply treatment, improvements of water conservation procedures, revision of waste water disposal contracts when regulations affect rate structures, and change of disposal or recycling procedures for solid waste water and toxic or hazardous materials.

-- Provides consulting services to installations on (1) matters concerning environmental compliance, (2) protection of natural resources, ground water resources, fish and wildlife refuges, (3) sanitary conditions of water supply systems and swimming pools, (4) environmental matters associated with community relations, (5) containment and disposal of major oil spills, and (6) contamination of community water supply by ordnance materials.

-- Stays abreast of latest developments and publications in environmental engineering with emphasis on water and air pollution problems and solid waste disposal and recycling systems.

-- Conducts formal and informal training for personnel at agency sponsored courses and seminars concerned with the safety of potable water supplies and the protection of water quality. Conducts training on planning for and conduct of water quality studies to standardize methodology and maintain high proficiency level.

Factor 1, Knowledge Required by the Position -- Level 1-7 -- 1250 Points

Knowledge of professional environmental engineering concepts, principles, and practices applicable to a full range of duties to resolve water quality problems associated with domestic and industrial waste water disposal and water supply operations at military installations world-wide.

Knowledge and skill to adapt standard practices, equipment, or techniques in developing technical parameters and preparing justifications for the eventual development of plans and designs such elements as continuing changes in program, technological developments, unknown phenomena, conflicting requirements, or rapidly changing guidelines and standards emanating from Federal, state, and local regulatory agencies.

Factor 5, Scope and Effect -- Level 5-3 -- 150 Points

The purpose of the position is to plan for and conduct investigations to identify and resolve water quality problems associated with or resulting from domestic and industrial waste water disposal and water supply operations at military installations. Results of the work affect the working and

living environment and the safety and health of occupants on such installations as well as adjacent communities. The employee's recommendations and decisions impact the agency's environmental engineering program, especially in terms of the need for alteration or improvement of existing facilities and ecological and environmental aspects of activities within the varied installations.

Factor 6, Personal Contacts -- Levels 6-3 -- 60 Points

Contacts are with officials, engineers and other subject matter specialists, and plant operating personnel within the department, architect-engineers and contractors, and representatives of Federal, state, and municipal regulatory and enforcement agencies. When problems involve installations located in foreign countries, contacts include representatives of comparable regulatory and enforcement activities.

Factor 7, Purpose of Contacts -- Level 7-3 -- 120 Points

Contacts are to explain the purpose and function of the agency's environmental engineering program; conduct surveys and investigations; resolve specific problems; develop factual data to base recommendations and decisions on issues where there are conflicting interests and opinions; justify feasibility and desirability of modifying existing facilities or using municipal facilities.

Factor 8, Physical Demands -- Level 8-2 -- 20 Points

Work is sedentary except during regular and recurring visits to installations where there is considerable walking, bending, climbing, and stooping to get in and out of manholes and pump station wells or in obtaining water samples above and below points of discharge.

Factor 9, Work Environment -- Level 9-3 -- 50 Points

Majority of the work is in an office setting; however, during visits to installations there is recurring exposure to unfavorable conditions such as working in areas infested by snakes or reptiles or in areas adjacent to tanks devoid of oxygen, containing bacteria, or emitting hydrogen sulfide.

TOTAL POINTS -- 2775

ENVIRONMENTAL ENGINEER, GS-0819-12, BMK #3

Duties

Serves as an environmental engineer on the staff of a regional office of a regulatory and enforcement agency with responsibility for independently planning and conducting complex, difficult, and sensitive construction grants projects. Assignments involve (a) industrial, municipal, and/or agricultural wastewater treatment processes within a state (or a major segment of a state) which includes especially complex and difficult construction and water treatment problems, (b) technical decisions which impact heavily on municipalities, industry, and facility users, (c) the

need for, development of, or extension of wastewater treatment facilities, (d) the provision of consultant services to grantees, state and local officials and contracting technical personnel, and (e) responsibility for technically sound construction and efficient operation of such facilities, a number of which are multimillion dollar plants

-- Reviews applications for grants for the construction of water pollution control facilities to determine compliance with Federal laws and program policies.

-- Reviews applications for engineering design, cost effectiveness, environmental considerations and adequacy of provisions for operation and maintenance of completed facility. On the basis of studies and consultation, prepares reports and analyses of findings and recommends appropriate action.

-- Reviews engineering and construction specifications and determines the adequacy of design and treatment to be provided. Insures that specifications adequately reflect and support construction plans, and that adequate provision and safeguards for protecting Federal interests are included. Negotiates modifications or recommends approval of plans and specifications.

-- Provides consultation on associated engineering programs such as analyzing the environmental impact of facility construction and emission of fully and partially treated waters.

-- Inspects waste treatment facilities during and upon completion of construction, including matters relating to the amount of construction completed and conformity of construction with plans, specifications and program requirements. Based upon findings, prepares reports and recommends approval or disapproval of partial or final grant payments, recommending corrective action as required.

-- Directs the preparation of or prepares special engineering reports for use by the region or agency.

-- Meets with prospective applicants to explain program policies and to assist in preparing grant associated documents and engineering papers.

-- Serves as the source of engineering leadership, information and advice within the organization concerning high dollar value projects, large regional facilities and/or major problem areas. In this capacity, serves as a source of information on location, availability, applicability and adequacy of guides, technical literature and regulatory decisions.

-- Acts as a witness and information source on matters within the area of responsibility.

Factor 1, Knowledge Required by the Position -- Level 1-7 -- 1250 Points

Knowledge of professional environmental engineering concepts, principles and practices applicable to the most complex technical construction and treatment projects and/or major construction facilities for metropolitan areas, industrial parks or major pollution sources.

Knowledge and skill to adapt engineering practices, technology and methods in the development of coordinated treatment operations where either amount, variety, or nature of effluent present serious technical difficulty in removal.

Familiarity with the related engineering fields (e.g., chemical engineering) and the capacity to adapt practices from these fields where relevant guidance is lacking in the environmental engineering area.

Knowledge and skill to review and evaluate the work of team members and lower grade engineers through the development of operating guidance, the review of project work and the provision of necessary orientation.

Knowledge and skill to assess the treatment needs of a metropolitan area, an industrial area, an industry or an agricultural concern and to translate these requirements into engineering plans, program operations and facility designs. Skill in communicating with technical personnel, state and local officials and elected representatives who may have other interests to advance.

Factor 2, Supervisory Controls -- Level 2-4 -- 450 Points

Supervisor makes assignments in the form of responsibility for a specific state or geographical area of a state together with functional responsibilities and broad overall objectives. Assignments are performed independently with considerable latitude for the exercise of judgment in resolving construction and treatment problems. Work priorities are determined by the employee; however, immediate or emergency commitments are established in consultation with the supervisor. Decisions, recommendations and commitments are accepted as technically accurate and rarely changed except for reasons of policy. Completed work and reports are reviewed in terms of broad objectives and for compliance with agency policies and regulations.

Factor 3, Guidelines -- Level 3-3 -- 275 Points

Guidelines consist of engineering manuals and publications; text-books; congressional acts; local, state and Federal regulations and statutes; agency policy and program directives; publications of professional societies. The employee is expected to select, apply and deviate from traditional engineering methods and practices as required either by the nature of wastewater treatment needs or the nature of the problems encountered. Judgment and originality are required to correlate the theoretical environmental engineering considerations with actual experience and to evolve engineering compromises, and to plan and coordinate the activities of team members as assigned.

Factor 4, Complexity -- Level 4-5 -- 325 Points

Assignments involve wastewater treatment facilities including integrated solid waste/wastewater treatment facilities and multipurpose urban drainage/waste water treatment facilities. Technical considerations of facility design, construction, operation, and modification require the application of sophisticated engineering judgments on a continual basis. Individual assignments require innovative judgments to resolve complex issues and problems that have numerous and varied features (e.g., seven or more) such as conflicting economic, environmental, and jurisdictional issues.

Factor 5, Scope and Effect -- Level 5-5 -- 325 Points

The purpose of the work is to ensure program objectives including adequate wastewater treatment, program integrity, and development of needed projects. This involves resolution of numerous and varied but complicated technical and jurisdictional issues with Federal, municipal and state officials and consulting engineers. The engineer provides advice and guidance on all program activities to Federal, local and state officials and to consulting engineers. The engineer acts as coordinator for all program elements and contact point for all persons outside the agency. The employee's recommendations and decisions impact agency, state and local programs and environmental objectives.

Factor 6, Personal Contacts -- Level 6-3 -- 60 Points

Personal contacts are with officials, administrators, scientists, elected representatives, municipal authorities, and representatives of state planning agencies and local planning groups, private engineering firms, manufacturers' representatives, technical specialists and attorneys from Federal, state and local government, and grantees. When problems involve installations located in or contacts with other territories or foreign governments the employee deals with representatives of comparable offices.

Factor 7, Purpose of Contacts -- Level 7-3 -- 120 Points

Personal contacts are with state and local officials, applicants, design engineers and persons from other non-agency organizations to give and review information, negotiate changes or difficulties, resolve such problems, explain decisions rendered and verify commitments.

Factor 8, Physical Demands -- Level 8-2 -- 20 Points

Work is sedentary except during regular and recurring field visits where there is considerable walking, bending, climbing and stooping to inspect wastewater treatment facilities and evaluate their construction and operation.

Factor 9, Work Environment -- Level 9-3 -- 50 Points

The majority of the work is in an office setting; however, during visits to sites and facilities there is regular and recurring exposure to construction and operation conditions such as noise, particulate matter, machinery; waters under treatment containing chemicals, bacteria and toxic particulates, and concentrated wastes from the treatment process.

TOTAL POINTS -- 2875

ENVIRONMENTAL ENGINEER, GS-0819-12, BMK #4

Duties

Serves as an environmental engineer on the staff of a regional office of a regulatory and enforcement agency with responsibility for independently planning and conducting a range of complex and difficult permit/compliance reviews for either an entire state or a geographical area of one or more states. Assignments (a) involve especially complex, difficult, or sensitive problems of analysis, including economic factors and the development of permit requirements/limitations of compliance actions, (b) involve the full range of industrial, municipal and agricultural wastewater processes and discharges, (c) normally involve technical decisions which are of considerable significance to municipalities, industry and facility users, (d) concern the need for, development of, improvement in, or extension of existing or construction of new facilities and systems, (e) require the provision of advisory, consulting, reviewing, operating and coordinating services in one or more of the permit program phases and, (f) involve exercising full technical responsibility for projects or studies of a complex or difficult nature that is of significance to the success or failure of the regional program.

-- Reviews applications and background data for permits and obtains or coordinates the collection of supplementary information.

-- Conducts technical analysis to determine methods for applying Federal and state water quality standards for inter or intrastate permit applications; considers proposed and existing discharges or deposits, environmental impact, abatement schedule provisions, monitoring parameters and provisions, adequacy of state certification, economic capability of permittee for sustaining environmental costs, and state-of-the-art technical capabilities.

-- Arranges for and conducts on-site visits and meetings with plant representatives, corporate officers and their legal staffs, and elected officials; surveys the facilities and analyzes leakage or spillage conditions, operating systems and technical methods used; determines if treatment and control processes are satisfactory and evaluates the need for additional control modifications or equipment. Writes reports and correspondence to respond to inquiries from technical representatives.

-- Discusses technical aspects of the permit; resolves questions raised by technical staff; explains legal requirements; reviews economic considerations; outlines application processes and furnishes information on proposed requirements; elicits responses and discusses problem areas.

-- Determines best practical control technology and treatment standards to meet applicable statutes; determines nature and significance of technical limitation; coordinates with state and local representatives when permit involves legal or technical requirements that are significantly different; develops public notices.

-- Initiates and outlines special technical studies by regional staff and other agency offices and laboratories to develop guidelines and special limitations. Interprets results of these studies in setting permit requirements and extrapolating conclusions for other areas.

-- Attends public hearings to answer questions and to enter comments; reviews hearing transcripts; participates in formal adjudicatory hearings and prehearing conferences to furnish, explain and defend technical requirements.

-- Reviews reports submitted by permittees and analyzes complaints of alleged violations from state officials, engineering consultants, congressional contacts and the general public; reviews information received and meets with program specialists and state enforcement personnel to discuss environmental impact of noncompliance; determines need for, arranges and conducts on-site investigations to determine extent of permit compliance; recommends further enforcement action; determines and recommends a technical solution; develops technical justification for adversary enforcement; provides expert testimony in connection with regulatory and investigative work.

-- Works with state agency personnel to develop a state operated permit program; furnishes advice on manpower requirements, reviews and advises on drafts of state regulations and protocols, and gives advice and guidance on technology and program parameters; monitors state outputs and ensures compliance; furnishes current policies, guidelines and regulations to the state for implementation; reviews state permit programs for adequacy, commenting on state plans and recommending actions on permit issuance and compliance/ enforcement matters.

-- Directs subordinate staff engineers as assigned, in planning and coordinating their work on major projects; developing guidelines; reviewing permit drafts for technical and regulatory sufficiency; coordinating projects with other operating units; conducting necessary staff training and orientation.

-- Stays abreast of the latest developments and publications with emphasis on wastewater treatment, water monitoring systems, and the environmental impact of water quality deterioration.

-- Establishes criteria for and reviews requests for variances from environmental standards and guidelines involving specific site applications and technological, biological, economic and practical considerations.

-- Reviews environmental impact statements and as appropriate, prepares sections of environmental impact statements.

Factor 1, Knowledge Required by the Position -- Level 1-7 -- 1250 Points

Knowledge of professional environmental engineering concepts, principles and practices applicable to the most complex technical problems associated with advanced and/or major water pollution discharge problems encountered by industry, metropolitan area and/or agricultural enterprise, including state-of-the-art technology and equipment development as well as the principles of effluent treatment.

Familiarity with related engineering fields (e.g., chemical engineering) and skill to adapt practices from these fields where relevant guidance is lacking in the environmental engineering area.

Knowledge and skill to adapt engineering practices, technology and methods in the development of regulatory guidance for industrial, municipal and agricultural interests and the advancement of technical enforcement activities.

Knowledge and skill to review and evaluate the work of team members as assigned through the development of operating guidance, the review of project work and the provision of necessary orientation, especially on large projects.

Knowledge and skill to: assess discharges as they affect the environment, the public safety and attendant interests, e.g., aqua life, wildlife, recreational purposes; translate technical analyses into legal, regulatory parameters; and communicate with a technical and lay community which may be either supportive or antagonistic.

Factor 2, Supervisory Controls -- Level 2-4 -- 450 Points

Supervisor makes assignments in the form of responsibility for a specific state or geographical area of one or more states together with instructions concerning functions and pertinent objectives and policies. Assignments are performed independently with considerable latitude for the exercise of judgment in selecting and establishing methods for resolving complex problems. Work priorities are determined by the employee. Decisions, recommendations and commitments are accepted as technically accurate and rarely changed except for conformance to policy. Completed work and reports are reviewed in terms of broad objectives and for compliance with agency policies and regulations.

Factor 3, Guidelines -- Level 3-3 -- 275 Points

Guidelines consist of engineering manuals and publications; textbooks; congressional acts, local, state and Federal regulations and statutes; agency policy and program directives; publications of professional societies; and technical guidance on production processes. The employee is expected to select, apply and deviate from traditional engineering methods and practices as required either

by the nature of the polluting process or the requirements of the problem situation encountered. Judgment and originality are required (a) to correlate the theoretical considerations in related engineering fields with actual experience to evolve engineering compromises, and (b) to plan and coordinate action to assure efficient and technically adequate responses to problems of individual permittees.

Factor 4, Complexity -- Level 4-5 -- 325 Points

Assignments involve conventional and unconventional aspects of environmental engineering as they concern the legal requirements, applicable technology, and methods of treating industrial, municipal and/or agricultural effluents. Similar problems are encountered with regard to the effective modification, improvement, extension and construction of waste water treatment facilities. Issues encountered fall within the state-of-the-art but generally involve a combination of many and varied complex features per assignment that differ from one industry, municipality or agricultural concern to another or from one production process to another, e.g., petro-chemical, steel, photo-chemical, food processing.

Factor 5, Scope and Effect -- Level 5-5 -- 325 Points

The purpose of the work is to provide advice and guidance to engineers in industries, municipalities and agricultural concerns in identifying and resolving especially critical problems encountered in meeting effluent restrictions. Results of the work affect production processes, influence the economic and technical ability of concerns and impact on the nature, life, and populace of communities subjected to effluents. The employee's recommendations and decisions impact regional, state and local environmental programs in terms of legal determinations and the need for alteration or improvement of treatment facilities.

Factor 6, Personal Contacts -- Level 6-3 -- 60 Points

Personal contacts are with officials, administrators, scientific personnel and elected representatives outside the agency. Typical of these contacts are manufacturers' representatives, private engineering firms, scientific organizations, specialists of other Federal, state and local governments, and environmental groups. When problems involve installations located in or contacts with other territories or foreign governments the employee deals with representatives of comparable regulatory and enforcement activities.

Factor 7, Purpose of Contacts -- Level 7-3 -- 120 Points

Contacts are to explain the nature of the agency's regulatory function and program; to develop technical analyses and to negotiate their acceptance often with antagonistic engineering and legal personnel. Where conflicting interests and opinions arise the employee uses contacts to develop analyses to justify feasibility and necessity of recommended action.

Factor 8, Physical Demands -- Level 8-2 -- 20 Points

Work is sedentary except during regular and recurring visits to the field where there is considerable walking, bending, climbing and stooping to get in and out of sites and to collect samples and make observational studies.

Factor 9, Work Environment -- Level 9-3 -- 50 Points

Work is in an office and field setting. During visits to sites and facilities there is regular and recurring exposure to unfavorable conditions such as dangerous chemicals, noise, fumes, contaminated water and machinery.

TOTAL POINTS -- 2875

ENVIRONMENTAL ENGINEER, GS-0819-13, BMK #1

Duties

Serves as environmental engineer for a major command of a military department with responsibility for (1) assuring technical adequacy of plans, designs, and specifications for the proposed modification or improvement of existing or the construction of new domestic and industrial waste treatment and water supply, distribution, and storage facilities of nine large installations and a number of off-base satellite sites dispersed nation-wide, and (2) advising on the interpretation and implementation of (and compliance with) environmental engineering policy directives and programs that embrace a range of subjects directly or indirectly concerned with public safety and/or the protection of natural resources. Assignments involve (a) the full range of environmental engineering facilities that are normally found at field level installations of a military department, and (b) programs directly or indirectly related to environmental engineering such as acquisition of potable water from on-base wells or via contract; chemical treatment of potable and industrial water supplies; water supply resources management; control of galvanic and electrolytic corrosion in boilers, water storage tanks, and cooling towers; chemical and biological treatment and disposal of domestic and industrial waste via on-base facilities or regional agreement with local municipal or county governments; treatment and disposal of toxic and corrosion process waste; collection, disposal, and recycling of trash and refuse via contract or use of landfills on-base; sanitation of swimming pools, lakes and other recreational areas; handling, collection, storage, and disposal of radioactive waste; control of pesticides and herbicides as used in residential, or on golf courses or other recreational areas; noise abatement; control of air pollution as may be affected by methane power plants or medical and classified incinerators; cutting and sale of timber; and fish or wildlife control.

-- Reviews new or revised policy directives or program materials of higher headquarters or regulatory agencies, developing and distributing procedural guides or instructions for implementation and compliance by installations. Serves as the primary contact to assure proper, timely and (when appropriate) consistent compliance.

-- Exercises staff surveillance over the operation and maintenance of environmental engineering facilities and the administration of specific programs by performing the following tasks:

1. Reviews plans, designs, and specifications for proposed modification of existing or construction of new facilities, (a) incorporating changes in site location, design criteria, methods of construction, funding, or selection and use of materials as necessary from the standpoint of sound engineering practices and economic considerations or to satisfy special missions and/or operating conditions, and (b) recommending approval or disapproval.

2. Visits installations to determine efficiency of existing facilities and equipment and assess methods and practices involved in, or planned for, the operation and maintenance of such facilities. Recommends replacement, repair, or improvement of facilities and equipment and makes unreviewed decisions to facilitate maximum service.

3. Develops specialized engineering analyses and solutions to technical and maintenance problems.

4. Establishes operation and maintenance standards for new or unusual installation activities having an adverse impact on natural resources.

5 .Recommends development of new or revisions to existing training programs and course criteria involving chemical laboratory methods and the operation and maintenance of waste and water treatment facilities.

6. Reviews installation contracts proposed for the purchase of water and/or sewage disposal services for technical sufficiency and adequate rate structure, recommending changes (when appropriate) prior to approval.

-- Provides consultative engineering service to installations for facilities and the varied programs, representing the command at conferences and meetings at higher headquarters and with other agencies.

-- Reviews and coordinates statements-of-work and specifications for custodial service contracts at all installations prior to issuance of invitation for bids to assure compliance with established policy and directives.

Factor 1, Knowledge Required by the Position -- Level 1-8 -- 1550 Points

Mastery of advanced concepts, principles, and practices of environmental engineering to serve as the technical authority for the full range of environmental engineering programs and facilities that are normally found at field level installations within a major command of a military department.

Knowledge and skill to apply the latest developments in environmental engineering to resolve problems for which accepted methods are not directly applicable and to review plans, designs, and specifications (prepared by others) for the improvement or alteration of existing or the eventual construction of new facilities.

Knowledge of related engineering fields such as electrical and mechanical.

Knowledge and skill to assess and advise on the impact of installations' activities on public safety, ecology, and environment involving matters directly or closely related to environmental engineering.

Factor 2, Supervisory Controls -- Level 2-4 -- 450 Points

Supervisor makes initial assignments in the form of functional responsibilities together with broad overall objectives and special assignments (as required) in the form of sensitive projects. Otherwise, assignments are either self-generated or received in accordance with established work-flow channels since the employee is the recognized authority in the field of environmental engineering. The employee carries out work independently, interpreting policy and regulations in consonance with established objectives, resolving most conflicts that arise, and coordinating work with others as required. Problems of unusual significance however are normally referred for the supervisor's views for development of a joint course of action. Work is normally accepted as technically accurate and generally constitutes the basis for final approval or enforsement by the supervisor.

Factor 3, Guidelines -- Level 3-4 -- 450 Points

Guidelines include standard material in the form of agency policies and regulations, textbooks, manufacturers' catalogs and handbooks, standard designs and specifications of the employee's agency and those of regulatory agencies, applicable codes that generally vary from one state to another, and established practices. Responsible for the development of instructions and explanatory material to implement policy and programs of higher authority the employee exercises judgment in assuring proper, timely and consistent implementation and compliance. Judgment is also exercised in resolving varied problems for which technical guidelines are insufficient or not directly applicable due, for example, to such unusual environmental conditions that impose stringent effluent or water quality standards.

Factor 4, Complexity -- Level 4-5 -- 325 Points

Assignments involve the full range of environmental engineering facilities and related programs that are normally found at field level installations of a military department. Visits to and consultations with installations require ability to resolve novel problems and modify or extend standard techniques. As the command technical authority, the employee provides installations with authoritative advice and direction on obscure design criteria, conflicts between engineering and management requirements, and other unusual requirements.

Factor 5, Scope and Effect -- Level 5-4 -- 225 Points

The purpose of the position is to provide advisory expertise at command level for the design, improvement, maintenance, and operation of environmental engineering facilities and the administration of related programs. Work efforts have a significant impact on environmental facilities and related programs at a number of field level installations.

Factor 6, Personal Contacts -- Level 6-3 -- 60 Points

Personal contacts are with other engineers at command level, at higher headquarters, and at field level installations; officials and managers of facilities; representatives of regulatory and enforcement agencies; installation commanders; and fellow members of professional engineering organizations.

Factor 7, Purpose of Contacts -- Level 7-3 -- 120 Points

Contacts are for the purpose of exchanging information, coordinating work efforts, discussing proposed plans for new or improved facilities and equipment, and answering questions or resolving problems of installation personnel. Since certain plans or problems entail controversial issues the employee must persuade other engineers to adopt specific methods.

Factor 8, Physical Demands -- Level 8-1 -- 5 Points

The work is sedentary in nature.

Factor 9, Work Environment -- Level 9-1 -- 5 Points

Work is performed primarily in an office setting although there is some travel to field level installations.

TOTAL POINTS -- 3190

ENVIRONMENTAL ENGINEER, GS-0819-13, BMK #2

Duties

Serves as a technical authority in environmental engineering for a military department with responsibility for (1) assuring technical adequacy of plans (prior to submission to Congress) as proposed by the department's commands and installations for the modification or repair of existing and the initial installation or construction of new industrial and domestic waste treatment and water supply, distribution, and storage facilities on installations world-wide, and (2) advising on the overall planning and programming requirements for, and problems encountered in, the operation and maintenance of such facilities. Advice rendered (a) pertains to the interpretation and implementation of (and compliance with) environmental engineering policy directives and applicable procedures under the department's military construction program, and (b) involves subjects directly related to environmental engineering such as water conservation; alleviation of stream pollution; supply, treatment, and distribution of potable and industrial water; control of galvanic and electrolytic corrosion in boilers, water storage tanks, and cooling towers; chemical and biological treatment and disposal of domestic and industrial waste; treatment and disposal of toxic and corrosion process waste; collection, disposal, and recycling of trash and refuse; purification plants for swimming pools; equipment and processes for the fluoridation of water supplies; and sanitary facilities for trailer parks.

-- Develops new or revised guidance material for department-wide use in the form of regulations, technical manuals, circulars, multiple letters, etc. pertinent to policy, procedures, methods, and technical criteria for the development of plans for the repair, modification or construction of facilities. Determines need for such material from information secured during field visits, analysis of field and chemical analysis reports, review of Department of Defense or congressional publications, assessment of problems referred from command and installations, and technical comments of the department or other Department of Defense organizational elements. Reviews and comments on publications (proposed by others) that relate to or impact on the operation and maintenance of the department's facilities.

-- Reviews operation and maintenance plans for inclusion under the department's military construction program in terms of whether requirements are essential, whether proposals are feasible, technical aspects, cost, standards, etc., discussing deficiencies with and advising appropriate command or installation of necessary remedial action. Serves as backup witness on technical matters to defend department's military construction program before Congress.

-- Responds to requests from other agency or Department of Defense organizational elements and congressional subcommittees for additional technical information concerning, for example, feasibility or possible deferral of a proposed plan or how a proposed plan will actually satisfy stipulated requirements.

-- Visits commands or field installations to observe operations and inspect or discuss facilities and processes, recommending solutions concerning, for example, need for new water sources, bacterial problems in water supply and sewage systems, or technical inadequacies of existing or proposed facilities or processes.

-- Keeps abreast of latest development in the field of environmental engineering by review of technical publications, attending technical conferences or professional society meetings, and discussion with industry representatives. Evaluates new products, processes, or techniques, recommending the adoption of those that would provide efficiency or economy.

-- Participates in training sessions for installation personnel concerned with the operation and maintenance of sanitary facilities.

Factor 1, Knowledge Required by the Position -- Level 1-8 -- 1550 Points

Mastery of advanced concepts, principles, and practices of environmental engineering to serve as a technical authority for the development of plans (including design criteria) for the eventual repair or modification of existing or the installation or construction of new facilities within a military department.

Knowledge and skill to develop the sanitary facility engineering portion of a formalized construction program and the judgment to evaluate and incorporate the latest developments in environmental engineering in department-wide guidelines, during the review of plans prepared by others, or to resolve problems concerned with the operation and maintenance of facilities for which accepted methods are not directly applicable.

Knowledge of related engineering fields such as electrical and mechanical.

Factor 2, Supervisory Controls -- Level 2-5 -- 650 Points

Supervisor renders administrative direction in terms of broad policy statements, making initial assignment in the form of responsibility for the sanitary engineering portion of the department's military construction program. The employee, within assigned area of responsibility, reviews plans independently, resolving conflicts that arise and coordinating work with others as required. Program requirements are established independently and the employee determines methods to be used and approaches to be taken in resolving problems and evolving final plans into a comprehensive program. Completed work is considered technically authoritative but reviewed for compliance with policy and effect of advice and influence on the overall program and, in addition, impact on current or future fiscal year funds.

Factor 3, Guidelines -- Level 3-4 -- 450 Points

Working chiefly under broad policy statements, the employee develops agency instructions and explanatory material for the preparation of technical plans for proposed facilities to be included in the department's fiscal construction program. Other guidelines include standard material in the form of agency regulations, technical manuals and bulletins, textbooks, manufacturers' catalogs and publications, design criteria of the employee's agency and those of regulatory agencies, and established practices. Included within the assignment are a number of plans for facilities involving technological issues which are extreme within the context of proven concepts and practices. The employee exercises judgment, ingenuity, and originality in either approving, approving with modification, or deferring pending development of acceptable criteria.

Factor 4, Complexity -- Level 4-5 -- 325 Points

Assignments involve a full range of domestic and industrial waste treatment and water supply, distribution, and storage facilities that are being proposed for modification or new construction and typically found on installations of a military department. Reviews work containing a variety of complex features performed by engineers at numerous locations. Technical considerations involving such work normally fall within the state-of-the-art but entail socio-economic problems and extension or modification of standard techniques to resolve obscure design criteria, conflicts between engineering and management requirements, and other unusual problems associated with a specific plan, type of facility, or installation location.

Factor 5, Scope and Effect -- Level 5-4 -- 225 Points

The purpose of the position is to assure technical adequacy of fiscal engineering plans that will ultimately, when approved by Congress, comprise the sanitary engineering portion of a department's construction program. Work of the employee has a significant impact on whether or not the department's environmental engineering facilities will be approved and funded for repair, modification or construction in a timely manner.

Factor 6, Personal Contacts -- Level 6-3 -- 60 Points

Personal contacts are with other engineers of the headquarters and the commands and installations within the department; officials and managers of command and installation levels; Department of Defense subject-matter specialists; representatives of congressional committees; equipment manufacturers; and fellow members of professional societies.

Factor 7, Purpose of Contacts -- Level 7-3 -- 120 Points

Chief purpose of contacts is to assure technical sufficiency of fiscal engineering plans proposed for the repair, modification, and construction of environmental engineering facilities within a military department. Other contacts are to provide additional technical information concerning such plans to Department of Defense representatives or congressional committees to advise on the status of individual plans or newly developed equipment, techniques, or processes; and to render consultative advice concerning problems encountered in the operation and maintenance of sanitary facilities within the department.

Factor 8, Physical Demands -- Level 8-1 -- 5 Points

The work is sedentary in nature.

Factor 9, Work Environment -- Level 9-1 -- 5 Points

Work is primarily in an office setting although there is some travel to command headquarters and field level installations.

TOTAL POINTS -- 3390

ENVIRONMENTAL ENGINEER, GS-0819-13, BMK #3

Duties

Serves as a technical authority in environmental engineering for a regulatory and enforcement agency with responsibility for (1) the development of new (or the revision of existing) guidelines concerning best practical and cost effective techniques, processes, equipments, and systems for use in the development of plans and designs for and the construction, maintenance, or operation of municipal waste water treatment facilities funded by Federal grants, and (2) furnishing consultative advice concerning such guidelines to agency headquarters and regional

representatives and engineers or officials of other Federal agencies. The guidelines typically (a) are in the form of regulations, technical reports or bulletins, policy statements, or program directives, and (b) include but are not necessarily limited to such subjects as alternate waste management techniques for best practical waste treatment; design criteria for mechanical, electric, and fluid systems and component reliability; performance requirements for waste water treatment ponds; design of waste water treatment facilities; level of effluent attainable through the application of secondary or advanced treatment; and potential toxic effects of chlorination to both aquatic and human environments and alternate methods of disinfection.

-- Reviews technical literature and publications and confers with government and nongovernment professional engineers, architect-engineering firms, research organizations, industry representatives, and technical organizations to keep abreast of latest developments of waste water treatment facilities and to obtain current information for use in the development of environmental engineering criteria.

-- Determines need for new or revised guidelines, coordinating with appropriate office for the establishment of research or development projects to obtain essential data as may be required for inclusion in or pertinent to specific guidelines.

-- Determines need for, organizes, and chairs working groups made up of representatives of other agency organizational elements (or other Federal agencies or non-Federal organizations if appropriate) to derive guideline drafts. Serves as a member on other working groups as required.

-- Analyzes pros and cons of alternate strategies, coordinating draft guidelines with other agencies and within agency headquarters, and making appropriate revisions after review and analysis of comments received.

-- Prepares briefing documents such as background reports, memoranda, or audio-visual aids to gain agency approval of proposed guidelines, briefing agency headquarters officials and, as required, congressional committee representatives.

-- Responds to inquiries from regional offices, congressional committees, and the general public concerning the interpretation and application of guidelines and, in the absence of such guidelines, information on current and future technology for municipal waste water treatment facilities.

Factor 1, Knowledge Required by the Position -- Level 1-8 -- 1550 Points

Mastery of concepts, principles, and practices of environmental engineering that enables the employee to serve as a technical authority in the development of guidelines concerning best practical and cost-effective techniques, processes, equipments, and systems for use in the development of plans and designs for the construction, maintenance, and operation of municipal waste water treatment facilities funded by Federal grants.

Knowledge and skill to evaluate and incorporate the latest developments in the environmental engineering field into technical guidelines.

Knowledge of related engineering fields, e.g., electrical and mechanical.

Factor 2, Supervisory Controls -- Level 2-4 -- 450 Points

Supervisor makes assignments in the form of subjects in need of new (or revised) guidelines together with broad overall objectives, priorities or deadlines; however, the employee recommends many of the subjects for development of guidelines. Such recommendations generally carry strong advisory weight. The employee independently plans own work, coordinates with other engineers or subject-matter specialists, resolves problems, and carries assignments through to completion. The employee renders advice independently but keeps supervisor informed of major or controversial issues. Completed work is typically accepted as technically accurate but subjected to review for conformance with policy, achievement of objectives, and compatibility with work of other functional elements of the agency.

Factor 3, Guidelines -- Level 3-4 -- 450 Points

In addition to a wide range of technical material (e.g., manuals and bulletins, textbooks and literature, manufacturers' catalogs and publications) guidelines include public laws and agency regulations and policy statements the contents of which are frequently quite broad and general in nature. The employee exercises judgment and ingenuity in developing nation-wide, technical guidelines (for use by others) which typically include subjects for which existing guides are totally lacking or technically inadequate. The employee exercises initiative and judgment in identifying and incorporating the latest and most pertinent technological concepts and practices.

Factor 4, Complexity -- Level 4-5 -- 325 Points

Assignments involve many and varied complex technical features including a range of techniques, processes, equipment, and systems pertinent to municipal waste water treatment facilities. Primary responsibility is the development of technical guidelines for use by agency headquarters and regional offices, state and local governments, architect-engineering firms, other Federal agencies, and contractors concerned with the development of plans and designs for the construction, maintenance, and operation of such facilities.

Factor 5, Scope and Effect -- Level 5-5 -- 325 Points

Purpose of the position is to provide an expert on municipal waste water treatment facilities and processes for the development of nationwide, technical guidelines. The employee also gives advice concerning their interpretation and application and, in addition, information on current and

future technology for the resolution of critical problems concerning such facilities or processes. The guidelines developed affect the work of engineers and subject-matter specialists of the employee's agency, state and local governments, other Federal agencies, and private industry.

Factor 6, Personal Contacts -- Level 6-3 -- 60 Points

Personal contacts are with engineers and other subject-matter specialists of headquarters and regional offices within the agency, officials and professionals of other agencies, industry representatives, members of congressional committees, and fellow members of national societies.

Factor 7, Purpose of Contacts -- Level 7-3 -- 120 Points

The chief purpose of contacts is to obtain or provide technical information concerning practical and cost-effective techniques, processes, equipments, and systems associated with waste water treatment facilities. Such information involves both current and future technology and generally involves alternative approaches and technical issues that are either conflicting or controversial in nature. The employee influences or persuades other subject matter specialists to adopt new or different approaches when confronted with conflicting or controversial issues.

Factor 8, Physical Demands -- Level 8-1 -- 5 Points

The work is sedentary in nature.

Factor 9, Work Environment -- Level 9-1 -- 5 Points

Work is performed primarily in an office setting although there typically is some travel to visit regional offices.

TOTAL POINTS -- 3290

ENVIRONMENTAL ENGINEER, GS-0819-13, BMK #4

Duties

Serves as a technical authority in environmental engineering on the staff of the construction-engineering office of a military department with responsibility for the development of engineering guide specifications and criteria for the design and construction or modification of domestic and industrial waste treatment and water supply, distribution, and storage facilities, swimming pools, and fire protection systems on military installations world-wide. Assignments involve specifications and design criteria that are mandatory for use by the military departments but also include those which are tri-service as well as government-wide in scope. Responsibility also includes the rendering of consultative advice to geographically dispersed divisions and districts of the construction-engineering office, architect-engineering firms, and commands and field level installations of two military departments.

-- Determines need for new or revised specifications and criteria as a result of reading technical literature; reviewing field investigation reports, proposed plans and specifications; and discussing with divisions and districts of the construction-engineering office, architect-engineering firms, equipment manufacturers, other professional engineers or architects, and subject-matter officials of departmental headquarters, commands, and installations.

-- Confers with using services and divisions of construction-engineering office on feasibility of modifying existing criteria or making use of new developments, coordinating design or other features with other departments or agencies for possible tri-service or government-wide application.

-- Identifies requirements (e.g., design criteria, scope of work, extent and scope of drawings, order of preparation, etc.) for new or revised specifications to be developed by architect-engineering firms.

-- Attends meetings, prior to negotiation of contracts, with prospective contractor to answer questions of engineering features, schedules or procedures, policies, and criteria for subsequent inclusion in contract.

-- Answers architect-engineer inquiries, during progress of contract, on interpretation of department manuals or guide specifications, schedules, procedures, policies, or technical problems.

-- Recommends appropriate action on specifications proposed by other departments or agencies for tri-service or government-wide application, coordinating with divisions and districts to obtain their technical viewpoints.

-- Answers inquiries from divisions and districts of construction-engineering office and architect-engineers on interpretation of guide specifications and engineering manuals, requested revisions to or waivers from guide specifications, revisions to standard drawings, or technical matters concerning drawings or specifications proposed by district engineers for individual projects.

-- Identifies need for and initiates appropriate guidance to divisions pending publication of new or revision of existing specifications.

-- Confers with representatives of industrial organizations on new hardware, processes, or procedures applicable to keep abreast of the state-of-the-art.

-- Visits division and district offices and departmental field installations to determine adequacy of current criteria on projects under construction and ascertain degree of compliance with existing standards and guides.

Factor 1, Knowledge Required by the Position -- Level 1-8 -- 1550 Points

Mastery of concepts, principles, and practices of environmental engineering that enables the employee to serve as a technical specialist in the development of agency guide specifications and design criteria for domestic and industrial waste treatment and water supply, distribution, and storage facilities, swimming pools, and fire protection systems on military installations world-wide.

Knowledge and skill to evaluate and incorporate the latest developments in the field into technical guidelines which, as a minimum, are mandatory for use within two military departments.

Knowledge of related engineering fields such as structural, mechanical, and electrical.

Factor 2, Supervisory Controls -- Level 2-4 -- 450 Points

Supervisor assigns work in terms of overall objectives together with areas of special interest and urgent concern. The employee is expected to carry out assignments, give advice, and take actions independently. The employee, at own discretion, keeps supervisor informed as to progress of work, unusual difficulties encountered, and problems requiring deviation from current policy. Completed work is evaluated in terms of effectiveness of the engineering guidance afforded others and conformance to policy.

Factor 3, Guidelines -- Level 3-4 -- 450 Points

Guidelines include agency regulations and policy statements in addition to existing guide specifications, design criteria, engineering manuals. The employee exercises judgment in determining need for new or revised specifications and criteria. While helpful and pertinent to standard practices the guidelines embrace a range of technical criteria involving concepts and principles which the employee must adapt or extend to achieve new or revised guidelines or in recommending waivers to existing guidelines.

Factor 4, Complexity -- Level 4-5 -- 325 Points

Assignments involve the entire range of domestic and industrial waste treatment and water supply, distribution, and storage facilities, swimming pools, and fire protection systems found on installations of two military departments, world-wide. Primary responsibility is the development of technical guidelines for use by divisions and districts of the construction-engineering office to which assigned, installations of two military departments, and architect-engineers and contractors involved in new construction or major improvement work. The employee exercises ingenuity and resourcefulness in prescribing uniform practices, with or without alternatives, for varied geographical areas characterized by different environment control problems.

Factor 5, Scope and Effect -- Level 5-5 -- 325 Points

The purpose of the position is to provide an expert on domestic and industrial waste treatment and water supply, distribution, and storage facilities; swimming pools; and fire protection systems for the development of guide specifications, design criteria, and engineering manuals for use by architect-engineers and field personnel of two different military departments as well as subject matter specialists within the divisions and districts of the construction-engineering office to which assigned. The employee's assignments also embrace similar guidelines which ultimately result in tri-service or government-wide application. The employee renders advice and technical assistance in their development, use, and interpretation. Work performed affects the work of environmental engineers within two departments, world-wide, and in some cases affects the work of engineers of other agencies and departments as well as private industry.

Factor 6, Personal Contacts -- Level 6-3 -- 60 Points

Personal contacts are with subject matter specialists within the construction-engineering office to which assigned, engineers of the office's divisions and districts, professionals of other agencies and departments, equipment manufacturers, architect-engineering firms, and fellow members of engineering societies.

Factor 7, Purpose of Contacts -- Level 7-3 -- 120 Points

The purpose of contacts is to advise on the development, use, and interpretation of engineering specifications and criteria, and including exemptions or waivers from existing guidelines. The employee also coordinates standards and guides with other departments and agencies. Such contacts generally require the employee to persuade or influence other subject matter experts to adopt or not to adopt technical issues.

Factor 8, Physical Demands -- Level 8-1 -- 5 Points

The work is sedentary in nature.

Factor 9, Work Environment -- Level 9-1 -- 5 Points

Work is performed primarily in an office setting although there is some travel to divisions and districts of the construction-engineering office to which assigned as well as the installations of two military departments.

TOTAL POINTS -- 3290

ENVIRONMENTAL ENGINEER, GS-0819-13, BMK #5

Duties

Serves as an environmental engineer on the staff of a regional office for a regulatory and enforcement agency with responsibility for coordinating the activities of one of a number of states

comprising the regions concerning the development of long- and short-range plans to achieve and maintain chemical, physical, and biological integrity of the state's rivers and tributaries, streams, and lakes. The assignment (a) concerns seven different basins, a number of designated areas, and numerous facilities, (b) pertains to the protection and propagation of fish and aquatic life and wildlife and use of the state's water resources for water supply and recreational, agricultural, and industrial purposes, and (c) involves three different types of plans:

-- Basin plans which include detailed descriptions of each body of water in a basin, identity and analysis of pollutant sources, a priority ranking of each segment of water for improvement, an analysis of measures needed to improve or maintain water quality, timetables for state action, and data (for hydrological basins) concerning such factors as economic growth.

-- Areawide plans which generally pertain to urban-industrial concentrations having major water quality problems and include identity of all waste generated in an area and all treatment facilities needed to handle current and future municipal and industrial waste; alternative treatment systems, land acquisition needs, and necessary collection and storm sewer systems; methods of financing; a program to control modification or construction and assure pretreatment of industrial discharge into any facility; and identity of processes to be controlled, e.g., non-point sources of pollution (including agricultural run-off), saltwater intrusion, disposal of wastes (e.g., solid waste into landfills), and disposal of sewage sludge.

-- Facility plans for individual waste water treatment plants which include cost-effective analysis comparing biological, physical-chemical, and land disposal processes as to most efficient method of treatment; alternatives for advanced sewer systems including an analysis of possible interceptor connections to other municipal systems; alternate sites and service areas; assessment of effect of proposed facility on air, land, water, and other resources; cost analysis of all facility components including rainwater collection systems, and an analysis (for high-cost projects) of facility's compatibility with land use and transportation needs; maps showing connecting interceptors, sewer lines, and other treatment works and systems; and an areawide assessment of the nature and extent of all types of water pollution.

-- Interprets and advises on implementation of water quality planning regulations, guidelines, and policies for state's pollution control program.

-- Evaluates continuing planning process of state to the point of finalyzing individual municipal facility plans, assuring consistency of facility plans with areawide plans and areawide plans with basin plans. Analyzes state strategy and milestones to assure adequate coverage of water quality problems and approach to solutions to conform with water quality standards. Determines extent to which goals and objectives are being met, recommending program changes to state.

-- Keeps informed of Federal and state legislation, regulations, and guidelines as well as new program requirements and court decisions on environmental actions pertaining to or affecting water quality planning.

-- Analyzes state stream monitoring proposals to insure adequate coverage of significant pollutants and frequency and location of sampling, evaluating water quality data and waste load information to determine adequacy for verification and use in water quality models.

-- Evaluates water quality standards for the state, recommending approval, approval with modification, or disapproval.

-- Coordinates planning function with other regional elements, including construction grant, discharge permit, and enforcement monitoring.

-- Evaluates waste load allocations, water quality modeling applications, and individual plans (or elements thereof), recommending approval or disapproval; and, conferring with state representatives and their consultants to assure satisfactory solutions or revisions.

-- Evaluates reservoir and other projects of other Federal agencies, rendering advice concerning impact on water quality within the state.

-- Confers with state and/or local officials and their consultants to advise on treatment processes needed to attain water quality standards, methods of developing adequate plans, or work out details and resolve controversies on planning problems, schedules, and revisions.

Factor 1, Knowledge Required by the Position -- Level 1-8 -- 1550 Points

Mastery of concepts, principles, and practices of environmental engineering that enables the employee to serve as a technical authority for the development of basin, areawide, and facility plans to achieve and maintain the chemical, physical, and biological integrity of a state's rivers and tributaries, streams, and lakes.

Knowledge and skill to assure that the latest developments in the environmental engineering field are incorporated into plans prepared by the state or its consultants; and, that the water quality planning activities of the state conform with agency or regional regulations, guidelines, and policies.

Knowledge of related disciplines such as hydrology and mechanical engineering.

Factor 2, Supervisory Controls -- Level 2-4 -- 450 Points
Supervisor makes assignment in the form of responsibility for the planning activities of a specific state together with overall objectives, established policy, and pertinent agency directives. Within assigned area of responsibility, the employee assesses state planning activities and reviews plans

independently, resolving most conflicts that arise and coordinating work with others as required. For the most part, the employee determines methods to be used and approaches to be taken in resolving problems and integrating state plans into a comprehensive water quality program. Completed work is normally considered technically authoritative but reviewed for compliance with objectives and affect of advice and influence on the state's overall water pollution control program and, in addition, impact on current and future fiscal year funds.

Factor 3, Guidelines -- Level 3-4 -- 450 Points

Guidelines include Federal laws and state statutes, agency-wide policies governing water quality programs, and such standard material as technical manuals and literature, textbooks, agency and regional planning criteria, and established practices. While helpful and pertinent to assignment, the guidelines embrace a range of administrative and technical criteria involving concepts and principles for which the employee must either adapt, extend or develop supplementary material due, for example, to specialized environmental conditions or individual characteristics of different localities or facilities.

Factor 4, Complexity -- Level 4-5 -- 325 Points

Assignment involves a full range of planning activities to achieve and maintain chemical, physical, and biological integrity of a state's rivers and tributaries, streams, and lakes. Individual plans frequently involve difficult or unusual negotiations or coordinations concerning technical, socio-economic, administrative, or other aspects, e.g., compromises between a theoretical ideal method and a more economical but technically less satisfactory one; unfavorable local conditions that preclude use of standard methods or practices; economic, social, or ecological benefits that could be derived as compared with estimated costs involved; public interest or urgency compared with local, state, or economic restraints; and conflicting interests and opinions between state and their municipalities and citizens or between region and state or their consultants. Employee actions constitute initial and, in many instances, the final regional recommendation or decision concerning the technical adequacy and cost-effectiveness of environmentally sound water quality plans.

Factor 5, Scope and Effect -- Level 5-5 -- 325 Points

The purpose of the position is to provide a technical authority to assure technical adequacy of basin, areawide, and facility plans that comprise the water quality portion of a state's pollution control program. The employee anticipates and initiates action on technical and socio-economic problems which are considered critical, i.e., if they are not identified in their early stages, they are likely to lead to serious consequences and affect public health and safety and personal relationships with state representatives and their individual communities.

Factor 6, Personal Contacts -- Level 6-3 -- 60 Points

Personal contacts are with engineers and other subject matter specialists within the regional and agency headquarters and state and municipal officials and their consultants.

Factor 7, Purpose of Contacts -- Level 7-3 -- 120 Points

Contacts are for the purpose of exchanging information, coordinating work efforts, assessing adequacy of state planning activities, discussing proposed water quality plans, and answering questions or resolving problems of personnel within the state, including consulting engineering firms. Contacts involve negotiation and persuasion to obtain the adoption of technical points and methods that are in conflict with the desires and opinions of state or municipal officials and their consultants.

Factor 8, Physical Demands -- Level 8-1 -- 5 Points

The work is sedentary in nature.

Factor 9, Work Environment -- Level 9-1 -- 5 Points

Work is performed primarily in an office environment although there is some travel to state offices and municipalities.

TOTAL POINTS -- 3290

ENVIRONMENTAL ENGINEER, GS-0819-14, BMK #1

Duties

Serves as one of several technical advisors and experts on the staff of a regulatory and enforcement agency with specific responsibility for: developing, proposing and promulgating effluent limitation guidelines, new source performance and pretreatment standards for industrial point source discharges; assuring the adequacy and validity of scientific, economic and technical data and findings used as support for effluent limitations and standards; gathering, developing and analyzing data and background information basic to the annual review and periodic revision of the limitations and standards; and developing technical information required by the judicial review of the various limitations, guidelines and standards for one of several nationwide broad industrial categories such as the food commodities and closely related industries, the organic chemicals industries and the metals and machinery industries.

-- Plans, develops, reviews, evaluates and directly participates in the establishment and implementation of a national effluent guidelines program for each individual industry within the assigned industrial category, working closely with and advising a selective group of highly technical private consultants to assure that study results are accurate and of the highest quality possible.

-- Provides expert advice and consultation to agency and/or contract technical personnel on problems of a highly technical nature pertaining to new and novel areas for which there are no established guidelines, criteria or specifications relating to implementation of the national industrial effluent guidelines program. Directs contractual efforts to assure that Federal funds are properly expended and that the technical product resulting from such expenditures is appropriately matched to the needs and requirements of the agency.

-- Evaluates technical data and information provided by contractor, industry, the public, and regional program staffs and reviews effluent requirements to determine the impact of wastes on receiving waters as well as reviewing the economic and overall cost impact on the industry.

-- Reviews and evaluates alternative and sometimes conflicting engineering treatment techniques of an advanced nature for their effectiveness and efficiency and suggests technical requirements necessary within the same industrial waste areas to support the advanced technology objectives and new effluent limitations. Identifies discrepancies or inadequacies in scientific and technical reports. Resolves problems and recommends solutions concerning priority of operational needs, coordination, investigation and planning.

-- Defines and resolves major problems encountered and as appropriate either resolves the major problems or modifies the scope of a contract as required to meet the program objectives.

-- Maintains current knowledge of advanced technology as it directly relates to the assigned industrial category. Evaluates industrial effluent standards or criteria for adequacy in light of emerging industrial technologies and changing needs, and recommends new standards as appropriate.

-- Directs extensive data and analysis surveys and reviews and evaluates related technical data, applying information received to update and revise the guidelines and standards or amend studies currently underway.

-- Develops development and supplemental documents for effluent limitation guidelines and new source performance standards which ultimately serve as a technical basis for all regulations used both by regulators and those regulated.

-- Provides technical consultation to the enforcement officials, general counsel, regional offices, and state officials, serving as an authoritative source of expertise in industrial waste water treatment technology and control. Provides general technical consultation and guidance within and outside the agency.

-- Provides technical assistance to the Department of Justice in developing responses to briefs filed in any Federal circuit courts of appeal. Evaluates issues raised by petitioner in

each judicial review and develops the agency's technical responses to the briefs and counter-briefs.

-- Develops technical data and information on the types and amounts of potentially hazardous materials present in industrial discharges and the methods and costs for treatment and control.

-- Serves as technical consultant to permit writers in the regional and state offices which have the national permits discharge elimination system permit issuing authority, providing technical assistance and training with respect to implementing industrial standards.

-- Keeps abreast of new methods and developments in specialty fields as they affect the program area and, as requested, advises appropriate officials of progress and difficulties encountered. Keeps informed of activities and programs of professional and scientific societies related to industrial waste and water management.

-- Consults and coordinates with other engineers, economists, and lawyers in the agency and those of other agencies who also are considered experts. Contacts representatives of public and private agencies and groups at the Federal, state, interstate, and local levels to exchange useful information on progress in the field and to assure compatibility with similar programs being conducted by other agencies.

-- Participates in interagency meetings or conferences as an authority in specialty area. Participates in meetings or conferences within the agency to plan cooperative activities and devise concerted approaches to problems.

Factor 1, Knowledge Required by the Position -- Level 1-8 -- 1550 Points

Mastery of advanced engineering concepts in the area of industrial waste water treatment within a broad industrial category which enables the engineer to provide expert advice and consulting services to industry and contractor representatives, who are generally experts and consultants themselves.

Knowledge and skill to serve as an expert witness in court cases on the state-of-the-art and economic feasibility of enforcing an effluent limitation; and to advise on the acceptability of a variety of advanced treatment technologies in meeting effluent limitations.

Knowledge and skill to evaluate the impact of a range of effluent limitations which may be imposed on a broad industrial category, taking into account: (1) the limits of current treatment technology, (2) the cost associated with requiring different levels of discharge, and, (3) the limitations of individual companies or groups of companies in meeting a specific standard.

Familiarity with methods and procedures involved in the compilation of technical findings presented and in determining the acceptability of procedures of specific standards being challenged in court.

Factor 2, Supervisory Controls -- Level 2-4 -- 450 Points

The engineer participates fully with the supervisor in establishing the overall objectives within the broad industrial category. Specific work and deadlines are occasionally dictated by judicial decision. The engineer has responsibility for planning, designing and carrying out programs, projects, studies, or other work independently. Technical decisions are considered as authoritative and are accepted without significant change. The engineer coordinates the work of engineering experts working for contractors with that of expert (in-house) engineers and interprets agency policy for those experts as the need arises. Keeps the supervisor informed of progress, potentially controversial matters, or far-reaching implications of the work.

Factor 3, Guidelines -- Level 3-5 -- 650 Points

Within broad policy guidance, the engineer develops effluent limitations and guidelines to be applied and enforced industry-wide. Virtually every limitation established is challenged -- either by industry on the basis of the limitation is too stringent or by environmental groups on the basis that the limitation allows too much pollution. The engineer adapts and interprets existing state-of-the-art guides within the scope of new as well as anticipated court decisions to counter arguments from each side of the issue. The engineer uses considerable judgment and ingenuity in interpreting and adapting guides that exist and in developing new and improved hypotheses, approaches, or concepts not previously tested or reported in the literature of the field.

Factor 4, Complexity -- Level 4-6 -- 450 Points

Assignments concentrate on the limitations of proven concepts and practices in the removal of pollutants from industrial waste discharges. Problems, on the one hand, include economic constraints of industry, the state-of-the-art of treatment technologies, and integration of this segment of water pollution control into the broader concept of all water pollution sources. On the other hand, public interest, fueled by environmental groups, demands that the ultimate goal of no pollution be immediately attained. The engineer is therefore working in a complex area, with socio-economic implications, under close public scrutiny, and is responsible to the courts for decisions rendered.

Factor 5, Scope and Effect -- Level 5-6 -- 450 Points

The engineer plans and conducts a segment of the agency's effluent guidelines program for a major industrial category. The limitations imposed are of national scope. The impact of a published guideline can frequently be measured in millions of dollars immediately and millions more over the following few years. Published effluent guidelines establish the agency's position at the time it is published and until such time as it is revised.

Factor 6, Personal Contacts -- Level 6-4 -- 110 Points

Personal contacts are with top engineering and scientific experts of consulting engineering firms and private industry and with counterpart engineers and scientists in other Federal agencies, state or local governments. Participates in interagency meetings or conferences as an authority in industrial waste water treatment.

Factor 7, Purpose of Contacts -- Level 7-4 -- 220 Points

As an expert witness in court, the engineer is called upon to justify and defend highly significant and controversial engineering matters. In meetings with industrial representatives, the engineer represents the agency in an attempt to negotiate and settle controversial approaches to effluent limitations prior to issuance of an effluent limitation.

Factor 8, Physical Demands -- Level 8-1 -- 5 Points

Work is primarily sedentary, even though the engineer does conduct on-site inspections of private or government-owned facilities which requires some walking and bending.

Factor 9, Work Environment -- Level 9-1 -- 5 Points

Work is performed primarily in an office setting, except for occasional onsite inspections of private or government owned facilities.

TOTAL POINTS -- 3890

ENVIRONMENTAL ENGINEER, GS-0819-15, BMK #1

Duties

Serves as a nationally recognized expert on the staff of a regulatory and enforcement agency with responsibility for observing, advising and reporting on the technological and economic feasibility of processes, systems, and components for the (a) conversion of solid waste into different energy forms such as gaseous, liquid, and solid fuels or steam and electricity, and (b) reclamation of paper, magnetic materials, aluminum, and glass. The assignment typically embraces different approaches pertaining to the recovery of energy value from refuse (e.g., waterwall incinerators to enerate electricity; pyrolysis to generate steam, to produce oil or gaseous fuels) and for the most part typically entails (1) design and construction of prototype or demonstration models, and (2) further research or exploratory development.

-- Conceives and recommends projects or studies to advance the state-of-the-art.

-- Coordinates technical elements of the organization's energy recovery program with related activities of other goverment agencies, promoting mutual cooperation in areas which can be combined for more effective results.

-- Develops authoritative papers and reports to state the agency's position and further the objectives of the organization's energy recovery program, publishing those which embrace new knowledge on subjects of far reaching interest.

-- Reviews (for technical feasibility and adherence with the organization's objectives) and recommends action on proposed contracts, grant applications, and in-house projects.

-- Confers with key government and private officials and top engineering experts in the field of energy recovery, representing the agency at technical symposia and conferences.

-- Monitors technical aspects of contracts and grants pertinent to the organization's energy recovery program to insure successful completion, recommending changes or solutions to problems or redirection of effort as required.

-- Review reports and papers of agency staff and contractors to insure technical accuracy and compliance with objectives, policies, guidelines, and laws affecting the agency or the organization's energy recovery program.

-- Conducts special studies in areas where little knowledge has been assembled to advise the agency in establishing policy or initiating action.

Factor 1, Knowledge Required by the Position -- Level 1-9 -- 1850 Points

Mastery of advanced principles and practices of environmental engineering that enable the engineer to investigate and provide consultative services on the entire range of systems, processes, and components for the recovery of energy value from refuse.

Working knowledge of related engineering fields such as electrical, structural, and chemical.

Knowledge and skill to serve as a nationally recognized consultant and expert on the state-of-art and the economic feasibility of processes, systems, and components for recovering energy value from refuse.

Knowledge and skill to apply new developments and experienced judgment to a variety of highly complex technical and socio-economic problems.

These knowledges and abilities are such as would be acquired through extended training and experience in the research and development or the design and construction of a range of energy recovery systems.

Factor 2, Supervisory Controls -- Level 2-5 -- 650 Points

Supervisor provides guidance primarily in the form of general policy directives and staff, time, and budget constraints. The employee typically initiates new projects or activities independently. The employee is the principal advisor to and collaborator with the supervisor on energy recovery issues and in this respect may assume the supervisor's duties during his absence. The employee keeps the supervisor informed of progress but recommendations and decisions of the employee are generally accepted as technically sound even though final approval may depend upon formal action of the employee's superiors. Completed work is generally reviewed for adherence to policy and for assurance that broad technical objectives are fulfilled.

Factor 3, Guidelines -- Level 3-5 -- 650 Points

Guidelines are broadly stated agency regulations and policy statements, engineering manuals, and manufacturers' publications. Since energy recovery systems and processes have only recently been proven as economically feasible and many of the systems and components border upon the state-of-the-art, the technical guidelines when available often have very limited applicability. The employee exercises judgment and ingenuity in deviating from the traditional methods that may be available, adapting and developing new methods as required. As a nationally recognized expert, the employee conceives of new projects or studies to advance the state-of-the-art.

Factor 4, Complexity -- Level 4-6 -- 450 Points

Assignments involve the full range of processes, systems, and components pertinent to recovery of the energy value from solid municipal refuse or waste. The processes have been proven to be theoretically sound but, only recently, economically feasible. While the processes are theoretically sound, acceptable methods, practices, and techniques are still in a state of change. Current systems and components are designed and constructed as pilot or demonstration models, requiring further research or exploratory development. Primary responsibility is (a) to assess, advise, and report on the technological and economic feasibility of such processes, systems and components, and (b) to assure that individual projects or studies undertaken will further the objectives of the organization's energy recovery program. Many of the projects or studies are pursued on a concurrent basis, but all generally involve the establishment of new or the refinement of existing methods and concepts.

Factor 5, Scope and Effect -- Level 5-5 -- 325 Points

The primary purpose of the position is to provide expert advice and guidance to engineers and officials of a regulatory and enforcement agency concerning the technological and economic feasibility of energy recovery systems for disposal of municipal solid waste. The employee's recommendations and decisions concern highly complex technical problems involving many areas of uncertainty. The employee's actions concerning the need for new or different projects or studies impact the agency's energy recovery program and affects the work of other engineers and subject matter specialists both within and outside the agency.

Factor 6, Personal Contacts -- Level 6-4 -- 110 Points

Personal contacts are with engineering personnel and officials of agency headquarters and regional offices, manufacturers' representatives, contractors, and key officials and professionals of other Federal agencies and state or local governments. Represents agency on inter-agency task forces and national and international engineering councils and conferences.

Factor 7, Purpose of Contacts -- Level 7-4 -- 220 Points

The purpose of the contacts is to provide expert opinions and advice on the technological and economic feasibility of designing and constructing energy recovery systems and, in addition, to defend, justify or settle controversial technical or socio-economic issues involving such systems. Assignments also involve active participation in high level conferences, negotiations, and meetings concerning subject-matter for which there are conflicting interests or opinions. The employee therefore must influence or persuade other subject matter specialists (who are quite often experts in the field) to adopt technical approaches and concepts when conflicts are involved.

Factor 8, Physical Demands -- Level 8-1 -- 5 Points

The work is sedentary in nature.

Factor 9, Work Environment -- Level 9-1 -- 5 Points

Work is performed in an office environment with some travel to attend meetings, symposia or conferences.

TOTAL POINTS -- 4265